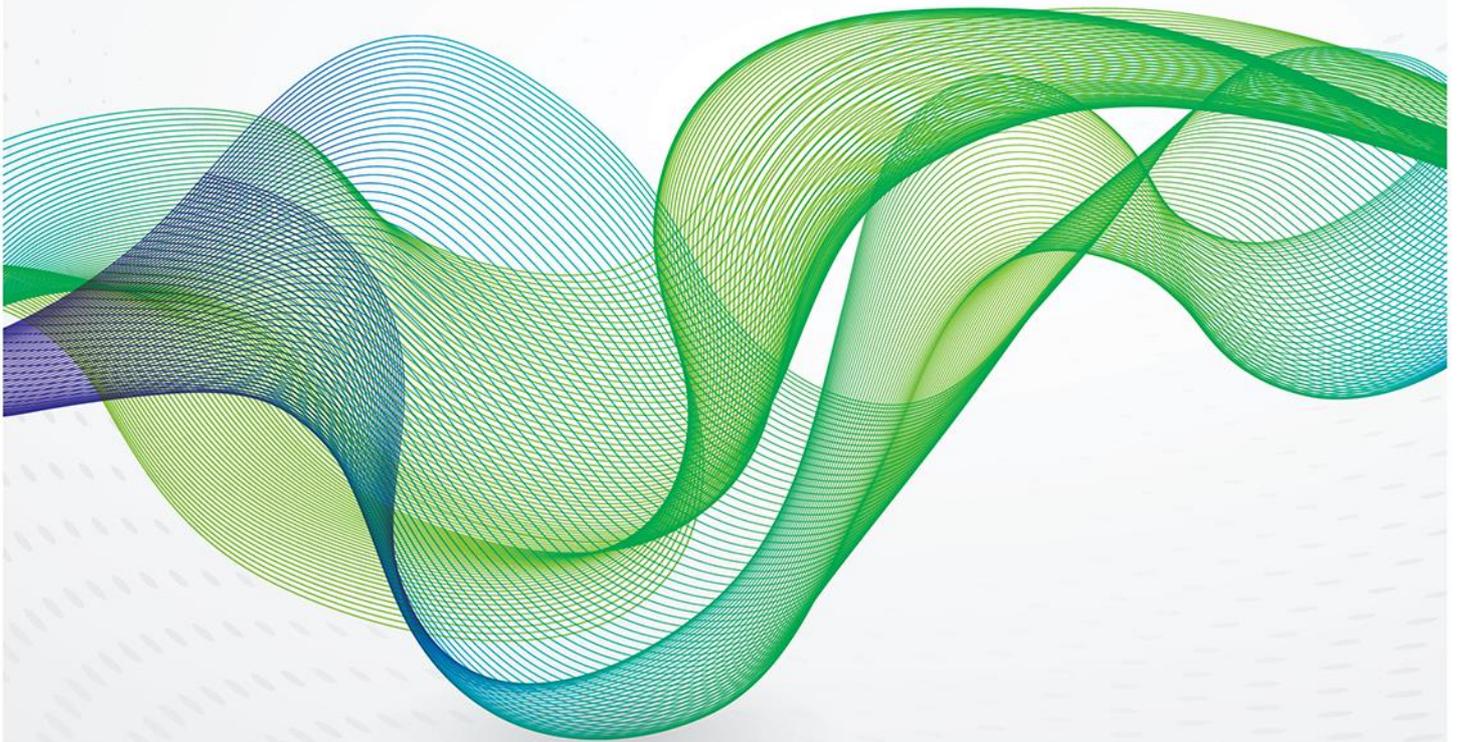




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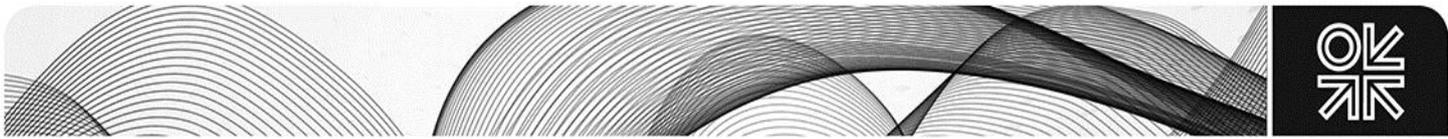
February 2015

Fundamental Petroleum Fiscal Considerations



OXFORD ENERGY COMMENT

Daniel Johnston
David Johnston



Introduction

Daniel Johnston and David Johnston¹

The business relationships between international oil companies (IOCs) and governments (Gvts.)² are some of the most dynamic in the world. The relationships are also different in other important ways. Unlike other industries where companies are paid a fee for providing goods and services to a government, IOCs are typically remunerated and reimbursed out of a share of revenues, production, profits or some combination of these. The main reason for such a significant difference is because of the cold harsh risks associated with petroleum operations.

The most common business structures in the industry today are either production sharing contracts (PSCs) or royalty/tax systems (R/Ts). Roughly half of the governments of this world use PSCs and the rest use R/Ts. While these systems are fundamentally different from philosophical and legal perspectives, their structures are dramatically similar from financial, economic, and accounting points of view. Both of these approaches to the business relationship provide the IOC a means of recovering costs incurred and earning a share of profits if (1) a commercial discovery is made and (2) sufficient revenues are generated. There has always been discussion about the most efficient and effective contract design from a financial/economic point of view. There are many things involved especially considering these agreements are structured to last decades in spite of all the risks and uncertainties.

However, recently, hot debate is underway over one of the most fundamental aspects of the world's agreements. The current debates in Mexico and India have been particularly intense. On one side of the debate are those who believe basic 'profits-based' structures found in the world's PSCs and R/Ts are the best alternative. On the other hand there are those who propose a structure based simply on the division of production or revenues. The overriding concern behind this initiative is the lack of faith in the accounting for costs and the specter of cost overruns, goldplating, or even cheating. In Mexico the debate has not entered the public domain but is being promoted by serious factions within Mexico. In India the positions have been formalized and explicitly articulated and publicly represented by two separate committees: The Rangarajan Committee³ and the Kelkar Committee⁴.

The Rangarajan Committee recommended the government move away from PSCs and embrace revenue sharing contracts (RSCs)⁵. The impetus for these recommendations, stem in part from controversies associated with the KG-D6 gas development and how PSCs and cost recovery mechanisms function. The disappointments associated with the Block KG-D6 development have been exacerbated by negative rumors and the types of claims that often characterize disputes that land in the court of public opinion.

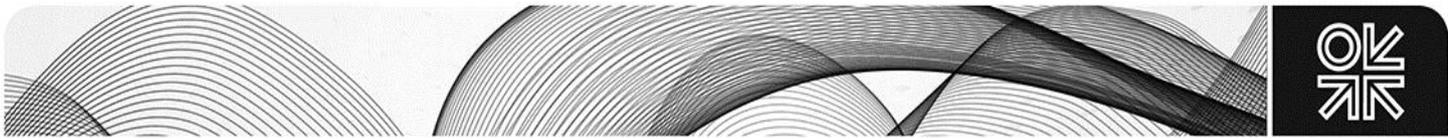
¹ Daniel Johnston and David Johnston are independent international petroleum advisory experts at Daniel Johnston & Co., Inc.

² The term here is used in its broadest sense to mean the sovereign state or its various representatives and authorities, such as a national oil company, oil ministry or agency.

³ Dr. Chakravarthi Rangarajan is an Indian economist, former Member of Parliament and Ex-Governor of the Reserve Bank of India and was on the Prime Minister's Economic Advisory Council.

⁴ Dr. Vijay L. Kelkar is an Indian economist, former Chairman of the Finance Commission until January, 2010. Previously he was Advisor to the Minister of Finance (2002–2004), and is known for his role in economic reforms in India.

⁵ Here 'revenue sharing' refers to a structure based on the division of *gross revenues* or *gross production*.



1. A revenue sharing system can be somewhat easier from a government management and administrative point of view but will not necessarily eliminate oversight requirements. There is more involved.
2. Revenue-based systems discourage investment.
3. RSCs are extremely regressive. Dealing with this thorny issue is extremely complex, and successful precedents do not exist.
4. As contracts and systems worldwide have evolved and improved for the past five decades revenue-based systems have become, for all practical purposes, extinct. The alternatives are more efficient and effective.
5. Profit-based systems represent over 90% of the governments worldwide with petroleum operations underway. The outliers are the big OPEC producers, most of Russia and until recently Mexico.
6. While the KG-D6 controversy is multidimensional and complex, one aspect relates to unsubstantiated claims of goldplating. KG-D6 development costs were strongly influenced by bullish industry-wide cost increases in the early 2000s. All parties were disappointed with the results. The pain was not unique to either party.
7. An extreme reaction is not appropriate. The current focus of attention is misplaced – it needs to be properly framed. It is not a systemic problem. There are rational, logical solutions.

The Rangarajan Committee

The Terms of Reference for the committee (section 1.5.4) are paraphrased as follows:

- Review existing PSCs, regarding the profit-sharing mechanism with the Pre-Tax Investment Multiple (PTIM) as the base parameter;
- Explore various contract models with a view to minimizing expenditure monitoring and oversight without compromising, firstly, future hydrocarbon output and, secondly, Government take.⁶

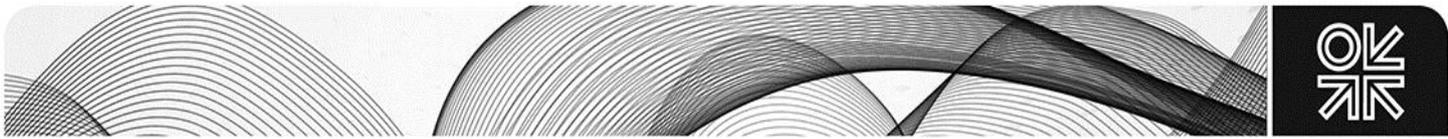
Key issues associated with existing PSCs were outlined in the Rangarajan Committee's Report submitted in December 2012. Key conclusions are paraphrased as follows:

The existing formula on sharing profit petroleum is dependent on cost recovery by the Contractor. This parameter determines the Government's and Contractor's shares of profit petroleum. However, this system encourages the Contractor to inflate costs to the detriment of the Government's share in profit petroleum.

Other areas of concern for the Government in a PSC relate to:

- i. Adequacy of investments made, to ensure stipulated levels of production;
- ii. Ensuring correct accounting and calculation of Government's take; and
- iii. Observance of procurement procedures laid down in the PSC.

⁶ Government take essentially represents the overall share of profits received from petroleum operations as a result of the fiscal/contract terms.



The Kelkar Committee

The Kelkar committee contested the Rangarajan Committee recommendation to move to a RSC. The table below provides a snapshot of key points of contention between the two committees.

The Opposing Views

	The Rangarajan Committee	The Kelkar Committee
1.	Proposed changing the fiscal regime to a simpler revenue sharing system.	Contests proposed changes, saying there is no need to move away from PSCs, which in their view are more investor friendly.
2.	Government to share in revenue as soon as production starts.	Contractor should recover all costs before sharing profits with the government.
3.	The cost recovery mechanism is a disincentive to reducing costs and is the root of the problems with the current fiscal regime.	There is no incentive for investors to goldplate, spend more than they otherwise would, or curtail production.
4.	Revenue sharing systems require much less oversight.	Current audits should not include oversight of performance or efficiency.

Revenue-sharing (AKA ‘The Peruvian Model’)

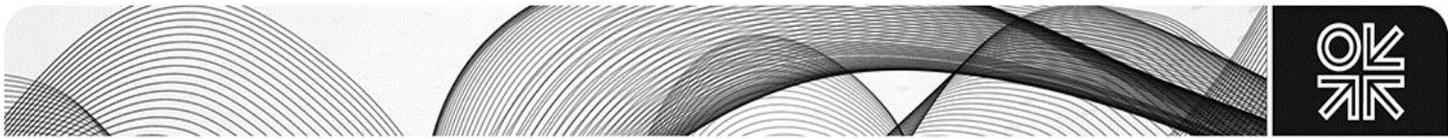
The revenue sharing model proposed by the Rangarajan Committee is equivalent to a model often referred to as the Peruvian Model (particularly in Latin America).^{7,8} This model typically splits gross production or revenues between the government and the IOC. The IOC is expected to recover costs and earn a profit out of their share of gross production.

These systems in their purest form eliminate the need to perform audits and the kind of oversight required in typical profits-based systems (PSCs and R/Ts).⁹ Governments have no need to monitor or even care about costs. Mathematically, a RSC works like a royalty — a large royalty, and by definition it has no profits-based elements.

⁷ “International Exploration Economics, Risk and Contract Analysis”, PennWell Books, 2003, p. 316, Johnston, D.

⁸ “Oil, Gas and Development – A View from the South”, Longman Trinidad Ltd., 1990, p. 116, Boopsingh, T. M.

⁹ This would mean taxes would need to be included in the government share and paid ‘for and on behalf’ of the IOC out of that share. This is called ‘taxes in lieu’ and is or has been used fairly widely (Egypt, Oman, Syria, Yemen, Qatar, Philippines etc.).



The table below summarizes the major shortcomings of the RSC model.

Revenue Sharing Contract Shortcomings		
1.	RSCs are notoriously regressive.	The government's share of revenue is like a huge royalty, invariably on the order of 40%.
2.	Inherently inefficient, it is extremely difficult to design RSC systems to adjust to variations in cost, pricing, or timing.	Past efforts to make RSCs efficient have not been successful.
3.	The RSC model is a disincentive to higher cost projects.	As costs approach the government's share of revenue, investor economics do not work.
4.	Investor's cost recovery rate is greatly reduced.	The government's revenue share acts like a limit on cost recovery to investors.
5.	RSCs are susceptible to premature abandonment.	Like most royalties, the revenue split brings the economic limit forward.

Regressiveness of RSCs - With a RSC a large royalty-equivalent is required in order to achieve a government take comparable to what India has received for years. For example government take worldwide is roughly 70% or more (undiscounted). In India a good working number for typical government take is closer to 80%.

In order for India to obtain roughly the same share of revenues in a relatively profitable environment a royalty-equivalent revenue sharing system will require a royalty on the order of 60%.¹⁰ However, as profitability increases with such a royalty, government take goes down significantly, approaching 60%.

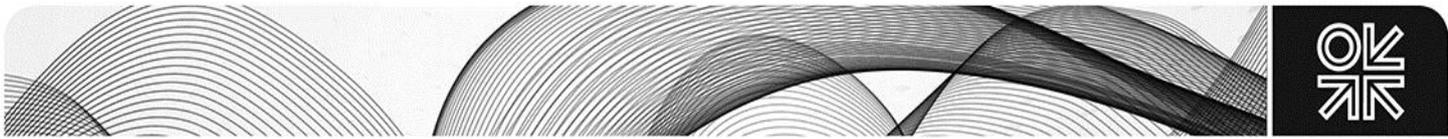
Inefficiency - To offset the regressive effect of the 'royalty', a progressive fiscal element would be needed. Progressive elements, by definition, must 'adjust' to variations in profitability, which inevitably is a function of costs, prices, and timing. The whole initiative behind the RSC is to avoid dealing with 'costs'. Therefore, a 'proxy' for profitability is required and experiences around the world with 'proxies' (such as production-based systems and price-based windfall profits-based systems) have not proven to be very successful.

Furthermore, new and unprecedented designs almost always trigger distortions, unexpected consequences, false economies, or loopholes. India would effectively be turning its back on over 50 years of contract evolution. There is always room for improvement, but to go with a RSC is like going back and starting from scratch.

Disincentive to high cost or marginal projects - Given a 60% royalty (or the equivalent as created by a RSC structured government share) and a less profitable field where costs as a percentage of gross revenues approach 40%, government take approaches 100%. IOC incentive to invest disappears long before that point. Even large fields could potentially be sub-marginal not to mention the specter of premature abandonment. This is one of the hallmarks of a royalty, particularly a large royalty.

Cost recovery rate reduced - By providing the government with a share of production 'off the top', the investor's rate of cost recovery would be dramatically reduced.

¹⁰ I.e. full-cycle costs as a percentage of gross revenues around 25%.



Early abandonment - The economic limit in its strictest sense occurs when operating costs equal one (1) minus the royalty rate. In the example above with a royalty of 60%, a field becomes uneconomic when costs as a percentage of gross revenues are equal to 40%, and any incentive to invest further in an existing field (or at all) begins to disappear long before that point.

Yet, from a project point of view there would still be economic profits equal to nearly 40% of gross revenues. But these profits are (by definition) not accessible to the IOC. Thus, the economic limit is not a true economic limit in the project sense but an artificial limit manufactured by the fiscal structure.

It is simply mathematically and economically impossible to maximize production and recoverable reserves without ultimately dealing with the royalty equivalent aspect of a RSC one way or another. Unfortunately, few of the options are simple. This is especially true with larger royalties. It is also unrealistic to think that the premature abandonment problem can be easily handled. This is particularly true with an inflexible rigid structure like that proposed in India where there is also such a powerful initiative to eradicate any discretionary powers.¹¹

Peru abandoned this approach years ago as did, Algeria, and Trinidad & Tobago in the mid-1970s. The Mexican taxing authority also essentially used this system in its relationship with PEMEX (the National Oil Company). The problems with the revenue sharing approach are some of the main reasons for the current 'Reform' in Mexico.

Profits-based systems have a solid foundation

Most governments with any appreciable petroleum operations in their country rely heavily on profits-based rent extraction mechanisms.¹² This includes over 90% of the governments worldwide.

Profits-based fiscal elements, primarily profit oil/gas sharing and taxes, account for the majority of revenues received by these governments from petroleum operations. Roughly 70-80% of the revenues come from profits-based mechanisms. The general breakdown is as follows:

	Government Revenues from Petroleum Operations
Signature and other bonuses	1-2%
Royalties	15-18%
Profits-based mechanisms ¹³	70-80%
Government participation ¹⁴	7-10%
Other	1-2%

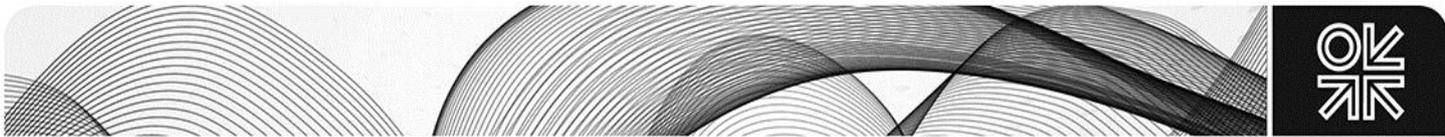
In virtually all of these categories of rent extraction or government revenue generation it is important to be able to monitor, oversee, audit, and trust the expenditures that are claimed as either (1) netback

¹¹ This is consistent with many of the well-intended extractive industry transparency initiatives worldwide that unfortunately push this aspect a little too far.

¹² The exceptions include Mexico, Russia and the large OPEC producers for example.

¹³ Taxes as well as government profit oil/gas shares.

¹⁴ Working interest participation normally based on a *carry* through exploration until commercial status is obtained.



costs (for royalty determination purposes¹⁵), (2) cost recovery (in the case of PSCs and service agreements) and (3) tax deductions. Most other countries are dealing with this.

Profits-based systems align the interests of all parties

Oil companies want to maximize profits, and when they do they typically maximize profits for both themselves and the government. When they choose the optimal development plan it is invariably the optimal plan for all parties. Thus companies have a strong incentive to keep costs down in order to maximize profits.

As mentioned above, royalties are one of the four main means by which governments around the world capture rent. In terms of government revenues they are not that significant, but they are important. The average royalty worldwide is around 7-8%. The reason they represent a proportionately larger share of government revenues around the world is that they are not 'based on profits'. Rather, they are based on gross production or gross revenues.

The Savings Index Concept

As stated, keeping costs down is normally a concern of all parties – the Gvt. and IOCs. There is clear alignment of interests on this issue, and most fiscal systems are well designed in this regard. All parties benefit if costs are kept down. Exceptions to this general rule are rare.

Just how much each party benefits can be measured – The 'savings index' is a direct measure of a company's incentive to keep costs down. From an undiscounted point of view, for many systems, a simple calculation can show how much a company gets to keep if it saves \$1.00.¹⁶ Only the profits-based fiscal elements affect this statistic.

The example below has two profits-based mechanisms: a 50% Gvt. profit oil share and a 30% income tax. A dollar saved means there will be an extra dollar worth of profit oil.

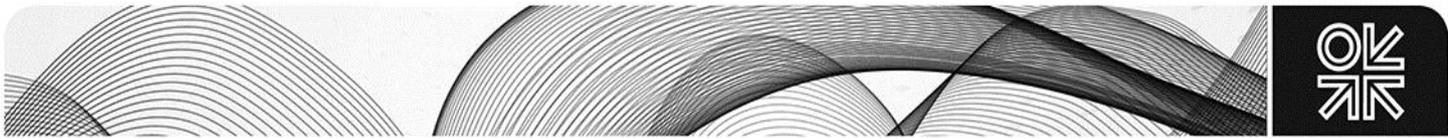
\$1.00	Profit oil
- .50	Government share
.50	IOC share of profit oil
- .15	Income tax (30%)
35¢	IOC cash flow

In this example the 'savings index' is 35%. For every dollar saved the IOC benefits by an increase in profits of 35¢ and the government 65¢.

A 35% index is a healthy incentive for a company to keep costs down – no special fiscal mechanism is needed. All parties benefit, but the government benefits more (65¢ on the dollar). However, it is still a powerful incentive for the IOC. The same result would have been obtained from a R/T system with two layers of tax (50% and 30% in series).

¹⁵ This is because often hydrocarbons are ordinarily well downstream from the royalty valuation point (often the wellhead or fiscalization point).

¹⁶ 'Key Concerns of Governments and Oil Companies: Alignment of Interests', Petroleum Accounting and Financial Management Journal, Spring 2000, Vol. 19. No. 1, pp. 1-12, Johnston, D.



Similarly, added costs effect all parties and in similar proportions. An added \$1.00 of expenditure reduces profit which ultimately would have been divided 65/35% in favor of the government. It is understandable that governments would be concerned about keeping costs down. Furthermore, when time value of money is factored-in the incentive for the contractor is often magnified.¹⁷ With a typical system the incentive goes from 35¢ on-the-dollar (or 35%) to upwards of 50% (discounted at 10%).

There could be substantial gains for a company from cheating – For example, with the system described above, if a company could recover costs that were actually not spent (i.e. over-invoicing), or otherwise dishonestly inflated, then this could provide a windfall equal to 65 cents on the dollar (65%). However, this is not such an easy thing to do.

As far as cheating is concerned this behavior is extremely risky, difficult to conceal, and the penalties are severe.

It is not as if governments must stand idly by and have no control. Governments have numerous means and opportunities to oversee, monitor, verify and exercise some control over costs. These include:

- The Budget Process**—Authorizations for Expenditure (AFE)s
- Work Program** and Development plan approval rights
- Procurement** laws and regulations
- Procurement** rules in PSCs and/or Joint Operating Agreements
- Auditing rights**
- Third party auditing**
- Government working interests**¹⁸ and other Partners—(Watchdogs)¹⁹

Many of these elements by themselves are fairly potent, but in combination they are even more powerful.

The realities of goldplating

A central issue in India is the claim of ‘goldplating’. Unfortunately, this term is often misused and abused. No doubt it is a serious concern, but it deserves a serious dispassionate examination of the facts.

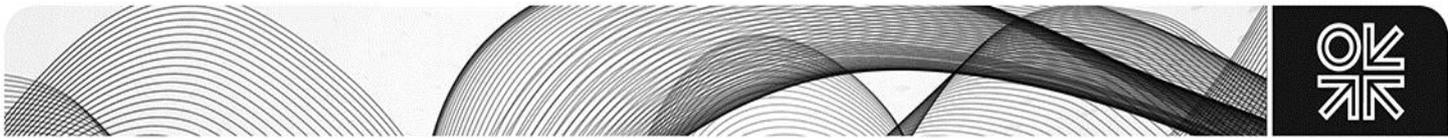
Goldplating is where a company spends more than it otherwise would because the over-expenditure enhances its profitability. *The more it spends, the more it makes.* This is the classical definition of goldplating—where the savings index is negative. It represents the ultimate in ‘inefficiency’ and ‘waste’.

It is unfortunate that claims of goldplating, as inflammatory as they are, are usually false, grossly exaggerated or apply to problems other than true goldplating. Those problems include transfer pricing (for both hydrocarbon sales or acquisition of goods and services), over-invoicing, or other forms of dishonestly inflating costs.

¹⁷ “More on the Savings Index” Petroleum Accounting and Financial Management Journal, Summer 2004, Vol 23, No 2, pp. 112-120, Johnston, D.

¹⁸ This affords government representatives an opportunity to sit in on management committee meetings as well as operating committee, technical committee, and budget meetings.

¹⁹ Working interest partners, so common in this industry, are also concerned with cost control and are perfectly able to perform their own audits. Joint interest auditing is a well-established profession and it serves the interests of both partners as well as governments.



There is almost always an incentive to ‘cheat’ by either over-invoicing or improperly procuring goods and services through an affiliate (i.e. transfer pricing). But these actions are not the same as ‘inflating costs’ (true goldplating). These kinds of potential fraud are not unique to PSCs or R/T systems, nor are they unique to the petroleum industry. Any tax-paying company or individual worldwide has an incentive to over-invoice or claim imaginary deductions.

Over-invoicing

Over-invoicing is a form of cheating that is technically unrelated to goldplating. Understandably the line gets blurred sometimes. As mentioned above, this kind of larceny is not a simple matter. For an operator to over-invoice or submit false claims, it must first either delude its partners or involve them. Also, the process is difficult to hide from auditors, and the risks are great.

Transfer pricing

This is certainly a legitimate concern regarding the acquisition of goods and services as well as for oil or gas sales. However, most governments have specific laws and regulations and contract provisions that deal with non-arms-length purchases or sales.²⁰ Also, procurement laws and regulations or PSC provisions establish a procurement framework for avoiding transfer pricing, and this is the kind of thing that an audit can disclose. Transfer pricing is not a simple matter, and again, dealing with working interest partners only complicates matters if an operator wants to try this.

Cost recovery mechanisms

There is considerable confusion about the typical cost recovery mechanism in a PSC. Cost recovery provisions, which are virtually universal, do not inherently encourage goldplating. The same is true of PSCs. Any assumption that goldplating flows from a typical cost recovery mechanism is simply false. PSCs do not encourage goldplating – and royalty/tax systems are not dramatically different from PSCs from a mathematical/financial point of view.

With royalty/tax systems companies are able to ‘take deductions’ (which consist of operating costs and depreciation of capital costs) in order to calculate taxable income. Thus deductions for tax calculation purposes are essentially the same thing as ‘recovering costs’ in a PSC prior to dividing profit oil. Therefore, in many respects, any claims of inefficiency or distortions associated with cost recovery could just as easily apply to nearly all systems around the world. The issue then is whether or not the claims are legitimate. They usually are not.

Strategic goldplating

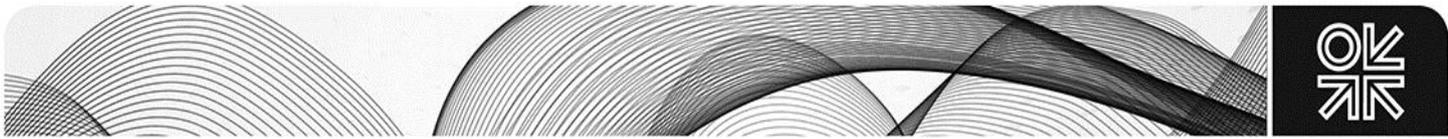
The main claims of goldplating usually conform to what is known as ‘strategic goldplating’. This is where a system is designed so poorly and inefficiently there is an incentive to goldplate from day one—during development planning. This kind of situation is rare in newer contract designs, but there were instances in the past that were fostered by some of the early R-factor-based systems or ROR-based sliding scales promoted by the World Bank^{21,22, 23}.

²⁰ Or contract provisions that deal with this.

²¹ ‘R’ stands for ‘ratio’ typically the ratio of the IOC accumulated returns divided by accumulated expenditures—essentially a ‘payout formula’. When a typical R-factor is equal to 1 this is the point at which the IOC has achieved payout. R-factors are relatively similar to the Investment Multiple in India.

²² “New approaches to profit sharing in developing countries” Oil & Gas Journal, June 25, 1984, p 119, McPherson, C., Palmer, K.

²³ Thus ROR systems are sometimes referred to as ‘The World Bank Model’ even though the concept was not invented by the World Bank.



Low Savings Indices

Sometimes the claim of goldplating is applied to systems with a low savings index. The old standard contract for oil in Indonesia (which prevailed during most of the late 1970s until the early 1990s) had a savings index of only 15%. Therefore, some analysts believed there was insufficient incentive to keep costs down. However, companies worked hard to keep costs under control with those contracts. With present value discounting the incentive was magnified. The undiscounted savings index is only a starting point for analysis of the incentive to economize.

Uplifts and Investment Allowances

Of the various 'incentives' that exist in the universe of petroleum fiscal devices, the ones most commonly associated with claims of goldplating are uplifts, or investment allowances. With devices like these, for example, a company may spend \$100 MM on capital expenditures and the government/contract may allow an uplift or an allowance of 20%. This would mean that for cost recovery purposes or tax calculation purposes the company could recover or deduct \$120 MM. Indonesia provided investment allowances for cost recovery purposes of 110% in some of their deepwater blocks.

These devices would appear to create a clear potential for goldplating. However, there is more to it than that:

- (1) Like many such devices, when an uplift or allowance flows through cost recovery they reduce the profit oil of which the IOC gets a share.
- (2) They are 'taxable'.
- (3) There could be considerable time-lag between expenditure and recovery.
- (4) There is no guarantee that sufficient production or expected oil prices will justify the risk of added (goldplated) expenditures. The normal risks are severe enough.

These factors eliminate most or all incentive to goldplate due to investment allowances unless perhaps they are particularly large. In that case they should be evaluated in light of the considerations outlined above. It is simply not appropriate to say that allowances cause goldplating.

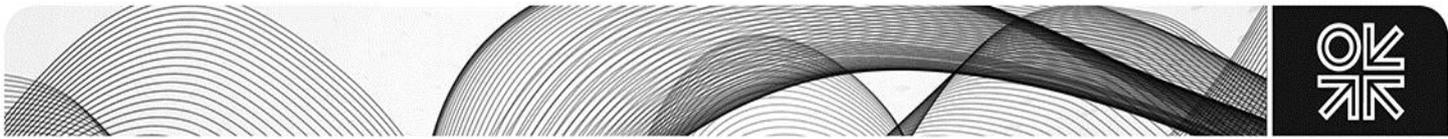
Goldplating Risks

One key aspect of strategic goldplating is that it carries with it unexpected risks. For example, it is well known in the industry that cost overruns are a fact of life. Staying within budget under ordinary circumstances can be extremely challenging. A company engaged in goldplating could find itself much more financially exposed because of the two-fold effect of deliberately overspending as well as unexpected cost inflation. This over-exposure could be catastrophically magnified if production rates or oil prices do not meet expectations. This kind of risk is very realistic and is not taken lightly by IOCs. To simply assume that a potential goldplating incentive found in a system will be followed lock-step by actual goldplating is an unreasonable expectation.

Opportunistic goldplating²⁴

This form of goldplating occurs with some of the older 'stair-step' R-factor or ROR scales (see Figure 1). As a company began to approach a threshold or 'trigger point' where taxes or government share of profit oil increased, there were situations where economic analysis indicated added expenditures could be beneficial. By increasing costs or manipulating (reducing) production in the accounting periods prior

²⁴ Kemp, A. G., Jones, P. D. A., "Progressive Petroleum Taxes and the 'Gold Plating' Problem", University of Aberdeen, September 1996, Department of Economics (North Sea Study Occasional Paper No. 59)



to a 'triggering' event and pushing it out into the future, company NPV could be improved at the expense of the government. This too is fairly rare, but it can occur. It depends on the design.^{25,26,27}

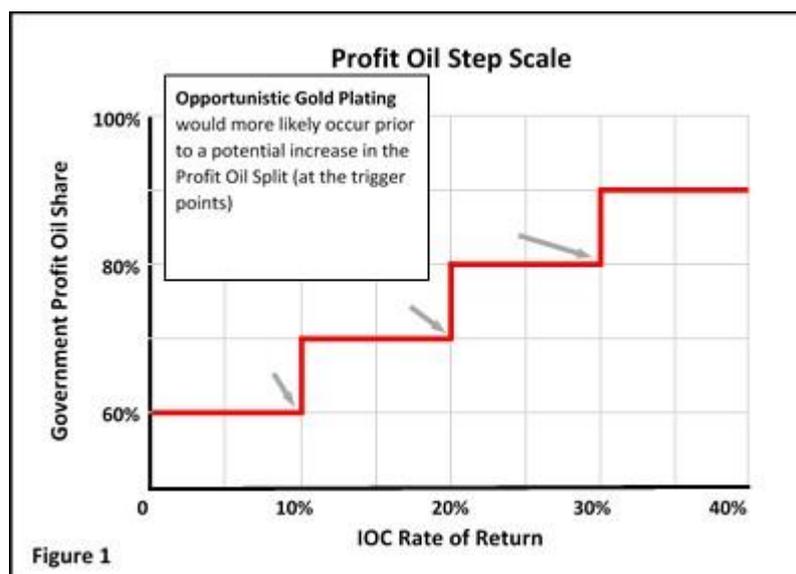
More modern designs have done away with the stair-step structures and replaced them with smoother formula-based (interpolated) sliding scales. Also, shortening accounting periods for these mechanisms makes a big difference.

It is possible with the more dramatic stair-step sliding scales both strategic and opportunistic goldplating can be a risk. However, the problems associated with these designs were being discovered in the late 1980s and early 1990s.

An example is shown in Figure 1 of a type of sliding scale that might inspire opportunistic gold plating. As a contractor approaches an accounting period where it can be seen that an increase of Gvt. Profit Oil might be triggered there may be an inclination to spend more than otherwise planned in order to put off entering the new fiscal territory.

The formula-based sliding scales (also shown below) help reduce some of the problems but the design of these kind of elements must be undertaken with care.

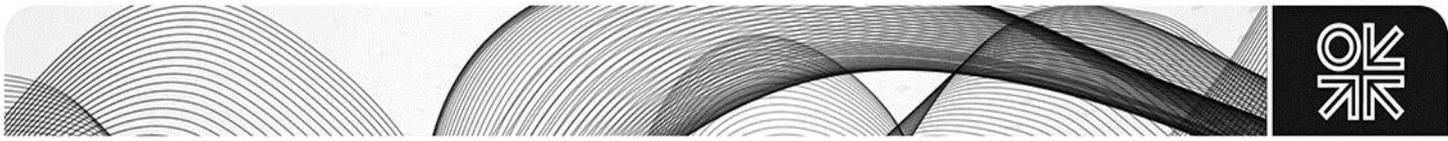
Figure 1: Profit Oil Step Scale



²⁵ International Monetary Fund, Fiscal Regimes for Extractive Industries: Design and Implementation, Prepared by the Fiscal Affairs Department Approved by Carlo Cottarelli, August 15, 2012

²⁶ Natural Resource Taxation, Master Class Session, Asia-Pacific Tax Forum Bali, November 16 – 18, 2011, Alistair Watson, Fiscal Affairs Department, IMF

²⁷ Alaska North Slope Royalty Study, Prepared for the State of Alaska, [Black & Veatch](#), November 2013



Adjustment Factors (R-factor and ROR systems) Uplifts

The more efficient mechanisms these days for creating a progressive fiscal system are the later-generation 'R factors' or rate-of-return (ROR) mechanisms. These are based on relatively direct measures of profitability.

An 'R-factor' is generally a formula based on the ratio ('R') of the IOCs accumulated receipts divided by accumulated expenditures (usually both capex and opex). Thus, typical R-factors are a measure of 'payout'. When an R-factor is equal to one (1) this represents payout — the point at which the IOC has recouped all costs and expenses. R-factors therefore 'adjust' the fiscal elements such as the profit oil share percentages or a tax rate (and therefore the government 'take') according to the IOCs 'payout status'. Similarly, ROR systems 'adjust' on the basis of the internal rate of return.

The Indian investment multiple (IM) is a variation on the "R-factor" theme.²⁸ India also has ROR-based PSCs.

In many respects, and for good reason, these systems are considered to be superior to alternative 'adjustment factors' such as:

- (1) production-based sliding scales,
- (2) price-based mechanisms,
- (3) technical factors such as crude gravity or gas composition, or
- (4) combinations of these.

Unfortunately, R-factor and ROR designs can have the potential to create goldplating. However, it is not fair to claim that all such systems have this flaw. While this is often claimed, it is simply not true. As mentioned above, it depends on the design and designs have come a long way since the 1980s.

For an example of goldplating associated with these elements, the most reasonable and legitimate place to look is with some R-factor or ROR-based systems based on the early designs. In those case, the triggered tax rates are high and the threshold rates of return are also set high so there could be an incentive to spend more.

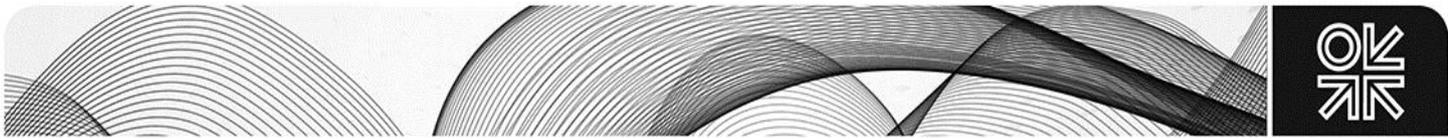
Examples:

Stair-step Scale			Interpolated Scale		
	Gvt. Share			Gvt. Share	
IOC ROR	Profit Oil		IOC ROR	Profit Oil	
< 10%	20%		< 10%	20%	
10 – 20%	40%	1 st Trigger	10 – 30%	Interpolated	
20 – 30%	60%		> 30%	80%	

An R-factor-based system could use similar scales but instead of ROR thresholds R-factors would be used such as < 1, 1 - 2, 2 - 3, and > 3.

Some of these early designs like the stair step scale above could provide both strategic and opportunistic goldplating incentives. Some of the most notorious systems were those with rate-of-return

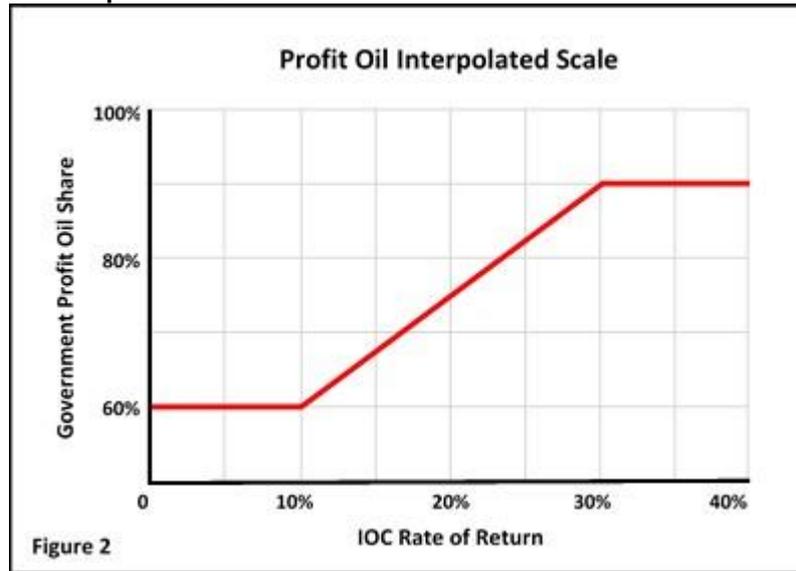
²⁸ IM is equal to the contractor's accumulated cost oil plus profit oil less operating expenses and royalty divided by accumulated exploration and development costs.



features with large tax differences between tranches. For example, some of the old contracts in West Africa had huge differences—up to a 40% profit oil differential between the share under the first tranche and the next (i.e. from 0% to 40%).

Opportunistic goldplating is nearly eliminated with a smooth curve (interpolating between points). A graphic example of the interpolated formula above is shown in Figure 2 below.

Figure 2: Profit Oil Interpolated Scale



ROR Systems

In the 1970s a new kind of sliding-scale formula or adjustment mechanism was introduced to the industry.²⁹ It was based on the IOC internal rate of return (ROR) from a project. The concept was developed by R. G. Garnaut and Clunies Ross, A. I in 1975.³⁰

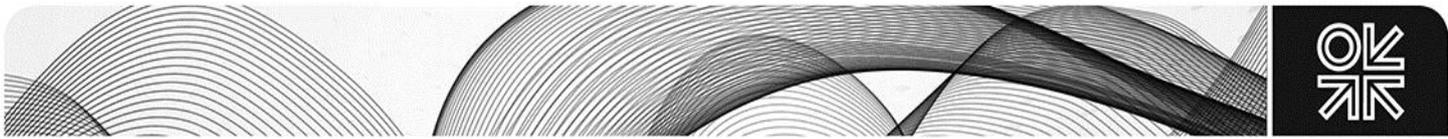
Systems that use the formula or this approach are often referred to as a 'Rate of return (ROR) system' or 'ROR contract'. Adjustment mechanisms based on this approach are sometimes referred to as 'resource rent taxes' (RRTs).

Approximately 10-15% of the countries worldwide use a ROR feature in their fiscal system or PSC. These countries include among others, Australia, Papua New Guinea, Russia³¹, Kazakhstan, Azerbaijan, Venezuela, Canada, Angola, Equatorial Guinea, and Uganda. Many of these countries and particularly many African countries that used this formula were part of the World Bank-financed petroleum promotion initiative of the 1980s. During these efforts new contracts and petroleum legislation were developed in 40 countries—particularly non-producing, developing countries.

²⁹ 'Adjustment Mechanism' is the term used in Mexico for a similar approach proposed by the *Secretaría de Hacienda y Crédito Público* (Hacienda).

³⁰ "Uncertainty, Risk Aversion and the Taxing of Natural Resource Projects" *Economic Journal*, 85,338, June, 1975, p. 272-87, Garnaut, R.G., Clunies Ross, A. I..

³¹ Sakhalin I and II and Kharyaga PSCs.



Therefore, systems that use ROR formulas are also sometimes referred to as “the World Bank model”. This is because of the belief that the approach was developed by the World Bank—it was not.

A central feature of these ROR formulas is that the rate-of-return be actually received by the IOC.

The theory and logic behind the rate-of-return systems was solid and well-intentioned. The adjustment mechanisms were essentially based on *true* measures of profitability (not a proxy such as production rates). The advantage of a ROR system over an R-factor is that it also takes into account time value of money.

The relative quality and efficiency of these systems depends on “rates”, trigger point thresholds, and effective tax increases.

Summary

Around 95% of the governments of this world use systems that are primarily based on the division of profits regardless of whether or not they use a royalty/tax system or a production sharing system.³² Revenue sharing systems have been tried and abandoned.

The advantages provided by progressive mechanisms like R-factors and ROR mechanisms, if designed properly, outweigh the risks, and the risks can be significantly mitigated if not essentially eliminated with more modern designs. Key aspects of the more modern designs include (1) interpolated scales and (2) shorter accounting periods.

When oil prices increased five-fold from 2002 through 2010 government take percentages in most countries went down. This is because most systems were regressive especially with respect to oil prices. They are not designed to handle a price shock like that. The exceptions to this generality were the systems with R-factors or ROR features and a few systems with specific mechanisms designed for variations in product prices (i.e. what are often called ‘windfall profit taxes’).

Governments and IOCs continually learn from unexpected or unintended consequences that sometimes foster false economies or distortions from new, untested contract provisions. These experiences are what drive the continual improvement and evolution of modern contract provisions.³³

Because of this, true goldplating is rare, and even where it once potentially did exist most problems have been or are being ‘designed out’.

Most countries believe they are better off with the fairly highly evolved, existing industry best practices instead of trying to establish a new framework based on what is essentially a failed system. The revenue-sharing foundation is weak.

³² These two families of petroleum fiscal/contractual arrangement comprise well over 90 percent of the systems in the world.

³³ “Changing fiscal landscape” *Journal of World Energy Law and Business* 2008 1: 31-54; doi:10.1093/jwelb/jwn006, Johnston, D.