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Resource Wealth and the Distribution of Resource Rents

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How to Spend It:

Resource Wealth and the Distribution of Resource Rents

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Abstract

Natural resource revenues differ from other government revenues both in their time profile, and in their political and legal status: they are volatile and exhaustible, and belong to all citizens of the country in which they are located. This paper discusses the optimal expenditure of natural resource revenues, based on economic theory and with reference to existing international practices. It considers both the distributional impact and the efficiency of alternative policies, focusing on the extent to which they succeed in providing all citizens with their share of the benefits due to natural resources. It also shows how, by dropping the assumption of a representative agent, a concern for poverty and social welfare more generally interacts with and alters standard recommendations for the intertemporal management of resource revenues.

1. INTRODUCTION

Resource rents are the closest we have to manna from heaven. They represent unearned value, providing a government with a potential source of revenue that should be easy to collect, enabling greater expenditures on behalf of citizens for a given tax burden. But natural resources are hard to manage. From the establishment of a productive resource sector, through the income flows to government and, finally, fiscal expenditures, resource revenues in practice are rarely uncontroversial.

This paper picks up the challenge from the point at which revenues from hydrocarbons and minerals start to flow to the government.[1] I ask how these revenues are spent in practice, and suggest how they might better be used to benefit the citizens who ultimately own them.

Resource revenues almost invariably flow through government budgets on their way to citizens. Their management is therefore a part of fiscal policy more broadly. But there are two features of resource revenues that set them apart from general revenues. First, their time profile is distinctive: revenues are volatile, driven largely by the volatility

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[1] Other natural resources, such as fisheries and agriculture, differ in their ownership structure and productive structure, and are not discussed here.

of commodity prices, and they are, generally speaking, temporary (though in some cases their lifespan is very long). These features imply that resource revenues may have to be smoothed over time, and that it may be optimal to save some share of them for future consumption. I discuss how these decisions should be made in the light of broader macroeconomic conditions and policy.

The second feature of government resource revenues is that they have not been taxed from any citizen, and all citizens have an equal claim on them. That is, unlike taxes that are raised on individuals and businesses in the economy, resource revenues have not been appropriated from anyone. In this sense resource revenues are *distributed*, but not *redistributed*. Moreover, citizens of resource-rich countries typically know this and have a strong sense of entitlement to their resources, a sentiment sometimes known as *resource nationalism*. As I discuss below, in many countries this has the unfortunate effect of lending support to inefficient and regressive fuel subsidies. But the underlying sentiment is justified.

Based on a consideration of the ownership of resource revenues, this paper focuses on the distributional impact of their expenditures. Unlike much of the literature, I drop the convenient fiction of a representative consumer in order to focus on how different forms of expenditure affect social welfare. The fiction is quite acceptable when the question is revenue stabilization or saving for the future, and I also adopt it in that context. But a concern with poverty reduction or inequality requires the recognition that different individuals benefit from resource revenues to different degrees, so the distribution of these benefits within a country also matters.

Given this focus, much of this paper is concerned with fiscal policies used by governments of resource-rich countries to get resource rents into the hands of their citizens, including public employment, public services, cash benefits and subsidies. I also consider the general equilibrium effects of resource revenues that are predicted by economic theory because these imply that household incomes will be indirectly affected by resources through structural changes in the economy, in addition to any direct effects due to fiscal policy.

The largest literature on the resource sector concerns the ‘resource curse’, the proposition that a large resource sector has adverse effects on a country’s economy,

politics and institutions. Reviews of this topic exist (e.g. van der Ploeg 2010) and I refer to these issues only to the extent that they are directly relevant to the question at hand.

One strand of this literature that is pertinent to the present topic concerns the frequency with which resource revenues are wasted, misused or lost to corruption. Mehlum, Moene and Torvik (2006) and Boschini, Pettersson and Roine (2007) argue that natural resources are good for growth in the context of 'producer-friendly' institutions and bad for growth in the context of 'grabber-friendly', i.e. rent-seeker-friendly, institutions. Karl (1997) argued that a large resource sector is itself likely to produce poor institutions, while Ross (2004) examines the argument that low levels of taxation, as are common in resource-rich countries, may help to sustain non-democratic and rent-seeking governments because untaxed citizens are less likely to demand government accountability. Under such circumstances Robinson and Torvik (2005) show how 'white elephants', or large government expenditures on capital formation or infrastructure that have negative social returns, may be used by politicians as tools of clientelism.

These are important reasons why resource revenues may not be spent optimally. In modest cases of corruption or misuse of revenues, solutions such as increased transparency may help. Solving the larger question of systematic misuse, however, involves fixing political systems and institutions, and the question of how to democratize a nation is beyond the scope of this paper. Our starting point is the assumption that policy makers are primarily interested in producing the best possible outcomes for their country. I refer to how institutional arrangements may improve or worsen outcomes, but not how to acquire such policy makers in the first place.

In discussions of resource rents there often emerge powerful intuitions that are not grounded in any rational judgement. One is that there is something undesirable about importing goods as opposed to producing them in one's own country. For instance, one hears Mexicans objecting to the fact that they have to import refined oil products despite their substantial exports of crude oil. To an economist this is no more than a prejudice: if it is cheaper to import goods than to produce them at home, then the imports are preferable. The exception to this is when there is some positive externality associated with producing a good, a point I will discuss later.

Another strong intuition often expressed in discussions of resource rents is that there is something immoral about living off rents without having to work. As I discuss later, Kuwaiti nationals, for example, could easily afford to live off their oil rents without working; some interpret their system of public employment as enabling just this. There may be good reasons for recipients of rent to work even if they do not have to, but I take the view that it is unrealistic and, indeed, patronizing to advise them not to spend their wealth on leisure if they choose to do so. As I discuss below, however, the Kuwaiti system as it stands is certainly inefficient.

The next section sets the stage by clarifying the concept of *resource rents* and discussing resource ownership. Section 3 turns to the core question of this paper: how do countries spend their resource revenues, and how should they spend them? I discuss intertemporal issues relatively briefly because they are already the subject of much of the existing literature. I discuss the within-period distribution in greater detail. Section 4 analyses the economic mechanisms through which natural resources affect household incomes, (almost) independently of the specifics of how revenues are spent. Section 5 concludes.

2. RENTS AND RESOURCE OWNERSHIP

The twentieth century saw a dramatic reorientation of resource ownership rights. First, the principle that governments as opposed to private landowners owned subsoil resources was settled in almost all countries (private land in the USA being the only major exception), with private agents gaining access to them through regulated contracts of various kinds (Mommer 2002). More dramatically, decolonization led to an assertion of the rights of developing country governments and a massive swing in bargaining power in their favour, away from the international mining companies and their rich-country owners that had dominated the industry. The development of national oil and mining companies was part of this trend.

This shift in power from mining companies to producer governments is the original sense of *resource nationalism*: the understanding that resources belong to the country in which they are located, and should be used to benefit that country. This principle has now been codified in numerous international human rights treaties (Wenar 2007: 14). Both the International Covenant on Civil and Political Rights and the

International Covenant on Economic, Social and Cultural Rights state in their Article 1 that 'All peoples may, for their own ends, freely dispose of their natural wealth and resources.' One hundred and fifty-one countries have adopted at least one of these treaties.

In practice, resource nationalism meant a rising share of total resource revenues going to national governments as opposed to international mining companies. So how much should a government expect to receive from its resources?

For clarification it should be noted that the term *resource revenues* is ambiguous. The broader sense refers to the total revenues due to natural resources – essentially the volume of the resource extracted times the international price – which have to cover costs of extraction, profits to private parties that are involved, and income flowing to the government. In almost all countries private mining companies are involved in extracting and processing the resource, and they require payment out of these revenues.

The narrower sense of *resource revenues* refers only to the revenues that flow to the government, after private companies and any other costs have been paid, and which are available for government spending. When there is any ambiguity I will refer to the former as total revenues and the latter as government revenues.

Theoretically, total resource revenues can be broken down into costs of extraction (including exploration and any other ex-ante costs) and *resource rents*. Rents are defined as the payment to a factor of production over and above the sum necessary to induce it to do its work (Wessel 1967: 1222). For natural resources, this implies that any payments to the resource owner that remain after competitive costs of extraction have been paid count as rents. This is because resources have no value while left in the ground, i.e. there is no opportunity cost to extraction, so the resource owner will be willing to have the resource extracted ('do its work') if doing so will provide them with any net income.[2]

Since the government is the owner of the natural resource, government revenues should in theory be precisely equal to the resource rents: payments to the companies involved count as costs of extraction, and the government should receive the remainder.

[2] If there are negative externalities to resource extraction, such as environmental costs or social costs to people who live near the extraction site, then analytically they are irrelevant to the breakdown between costs and rents precisely because they are external. Economic efficiency, however, demands that these costs be internalized, so extraction will be efficient only if the rents at least cover the value of any externalities.

In practice, however, it is very difficult to identify what counts as resource rents because it is very difficult to specify precisely how much the relevant costs should be. Costs of extraction arise from the employment of land, labour and capital, embodying human capital and technology. These are typically provided by the mining company that is contracted by the government (or, in the case of national mining companies, may be owned by the government). They must also include the costs of exploration, which build in the risk of finding no resources. But all these costs vary over time. Moreover, mining companies require at least a normal return to their capital over time, but will put up with large swings over the cycles of rising and falling prices. That is, what may appear an excessively high return on capital in one period may be making up for very low returns in the past or future, and vice versa.

For these reasons there is no a priori way to determine how much of total resource revenues count as rents. The only practical way to ensure that governments receive the rents they are due is to ensure that the processes by which contracts are awarded are competitive and transparent. When they are, competition between companies will bid down what they charge and bid up the amount received by the government. If the process is fair, then one may even say that whatever the government gets after such a bidding process counts, by definition, as the rents, because the process has revealed what the correct (competitive) costs are.[3]

3. HOW TO SPEND IT: THE INTER- AND INTRA-TEMPORAL DISTRIBUTION OF RESOURCE REVENUES

The share of total natural resource revenues that flows to the government is a component of fiscal revenues more generally, and should be considered in the light of overall fiscal policy. Indeed, in most countries the government simply absorbs resource revenues into the general budget, making no extra effort to manage them. But the intertemporal distribution of resource revenues demands particular attention for two reasons: first, revenues tend to be highly volatile, reflecting the volatility of commodity prices. Second, they are in principle exhaustible and in many cases will be expected to run out in the foreseeable future. Volatility calls for short-run expenditure *smoothing*; exhaustibility

[3] Radon (2007) discusses the challenges faced by resource-rich countries in negotiating with oil companies, while Johnston (2007) describes how to analyse the terms of a contract.

may call for long-run *saving* (which is formally just longer-term smoothing). Both, however, need to be considered in the context of wider intertemporal macroeconomic policy, as I discuss below.

The composition of expenditure of resource revenues within a given year, or intratemporally, must also be considered in the context of fiscal expenditures more generally. But again they deserve special attention, in this case for the political-legal reason that citizens typically view them differently from other sources of tax revenue. We saw above that it is in the nature of rents that they should not belong to any individual or group of individuals in particular, but instead belong to all citizens, since those factors required to extract and process the resource are already being paid before the rents, or government revenues, are calculated. For this reason, citizens often have strong feelings about the appropriate use of their resources and the revenues they provide. Later I will show that some of these feelings – in particular, the widespread view that living in an oil-rich country implies that one should be entitled to cheap fuel – are misguided. But we will also see that there are better ways of satisfying the quite justifiable view that resources belong to all.

In economics the analysis of intertemporal issues invariably assumes a representative agent, and most discussions of natural resource revenues do not go beyond this assumption. But any analysis of social welfare, including any analysis of poverty reduction, has to discard it and recognize that different people have different starting positions, and receive different benefits from the various forms of expenditure. Indeed, the same assumption that motivates the intertemporal analysis – that income provides diminishing marginal returns to utility – also, under standard social welfare functions, implies an aversion to inequality. The optimization problem is essentially the same: diminishing marginal utility implies that it is optimal to smooth expenditures over time, and also to smooth incomes across individuals, i.e. reduce inequality.

Atkinson's (1970) classic analysis of the link between the distribution of income and social welfare, however, shows that it is not necessary to go via utility because one can jump straight to a social welfare function with diminishing marginal returns in each individual's income. The social welfare function that Atkinson derives is precisely

isomorphic to the standard modern analysis of intertemporal optimization (e.g. Obstfeld and Rogoff 1996).

Both analyses use the (symmetric) constant elasticity of substitution function,[4] where the only parameter to choose is the elasticity of substitution itself, or equivalently the elasticity of marginal utility. The Stern Review on *The Economics of Climate Change* (Stern et al. 2006) assumes a value of one, which implies that a 1 per cent change in income is valued equally at any level of income (see Beckerman and Hepburn 2007 for discussion). Thus if society is twice as rich in thirty years' time then we value an income rise of $2 then as much as we value $1 today. Using the same value for an Atkinson social welfare function would imply that as a society we value $1 to person *X* as highly as $2 to someone who has twice *X*'s income. Thus extra income is more important in poorer periods, and for poorer people.

Not everyone will agree with an Atkinson social welfare function. But most people agree that eliminating extreme poverty is an urgent goal in itself, and that $1 that raises someone out of extreme poverty is more important than $1 given to someone not in poverty. This assumption lies behind the World Bank's motto that 'Our dream is a world free of poverty', for instance. It implies a social welfare function that has diminishing marginal returns to individual incomes at least around the poverty line. This on its own justifies a concern with the distribution of income, and hence with the distributional incidence of resource expenditures.

3.1. Intertemporal issues: revenue saving and smoothing

The volatility of resource revenues implies that special efforts may be required to smooth them. Their exhaustibility implies that it may be optimal to save some portion of them for the future. Both need to be considered in the wider context of macroeconomic management, specifically macroeconomic stabilization and economic growth.

The volatility of resource revenues is driven primarily by the volatility of commodity prices, and is famously difficult to manage. The temptation is to spend all the revenues that are available at any given time. The standard intertemporal economic model of consumption, based on the assumption of diminishing marginal returns to

[4] And for the same reason, namely that it is the only symmetric, additively separable and homothetic function.

income, implies that it is optimal to consume the same amount in each period, requiring saving in periods of high revenues and dissaving in periods of low revenues. This does not take into account macroeconomic cycles, however, and standard macroeconomic analysis requires that fiscal policy should still be counter-cyclical where possible. Thus the point is not exactly to smooth expenditures, but rather to vary total expenditures according to macroeconomic needs, and not according to the level of current resource revenues.

There are also important practical reasons for avoiding expenditure volatility. These are due to frictions both in government expenditures and in the economy, which imply that volatile expenditures can have real costs. Economic frictions imply that a rise in expenditures may lead to bottlenecks as productive resources (labour and capital) cannot move quickly enough to fulfil all new demands, causing inflation in sectors with shortages; a decline in expenditure will lead to unemployment and idle capacity.

Frictions in government expenditures, both bureaucratic and due to political pressures, imply that when revenues fall it is difficult to make expenditure cuts, or to impose cuts in private consumption. This is likely to lead to fiscal and/or current account deficits and, over time, to unsustainable debts. This was the experience of Zambia from the mid-1970s and through the 1980s, when national expenditures did not adjust to declining copper revenues, leading to crises in the late 1980s (Adam and Simpasa 2009). All of these problems can be avoided by effective smoothing of revenues.

The difficulty with smoothing is that it requires an estimate of the long-run value of revenues, which in turn requires estimating the long-run commodity price (as well as extraction costs). This is impossible to do with certainty. Chile takes two difference approaches for two different minerals, the revenues of which are managed in its *Fund for Social and Economic Stabilization*. Its major export, copper, has comprised 14–21 per cent of GDP as value added since 2005, while government revenues due to the resource are 1.7–5.7 per cent of GDP, or 9–22 per cent of total government revenue. Chile employs a panel of experts to estimate the long-run price of copper in order to smooth the expenditure of these revenues. For revenues from molybdenum, a much smaller export, Chile takes the moving average of the monthly prices for the past four years (Fuentes 2009).

While smoothing resource expenditures is both technically and politically difficult, there is virtually uniform agreement that, for the reasons above, it is highly advisable. The question of saving revenues for the future, however, is more debatable.

The intertemporal economic model above is also known as the *permanent income* (PI) approach, and this highlights the second standard recommendation for revenue management: that revenues due to an exhaustible resource should be saved, with only their permanent or annuity value spent each year. A still more conservative approach than this is the *bird-in-hand* (BIH) rule, which states that all revenues should go into a fund, and that current consumption should come only from the real return to that fund. Under BIH it is therefore the real return to already-extracted resources, as opposed to the expected real return on the value of the entire resource stock, that is spent. Therefore once the resource is exhausted BIH collapses to the PI rule, but expenditures start off lower than under PI and on a rising path, levelling out only once the resource is exhausted.

The BIH rule underlies Norway's *fiscal rule* for oil revenues, under which all of the net cash flow from the extraction of petroleum is saved in the *Government Pension Fund: Global* in order to finance pensions in the future. Since 2005 oil and gas production have comprised 19–25 per cent of GDP as value added, of which government revenues from the sector comprised 4–6 per cent of GDP, and 7–10 per cent of total fiscal revenues. The fiscal rule states that for current expenditures, only 'the expected return on the fund can be used. The expected real rate of return on the fund is estimated at 4 per cent. This means that the fiscal budget can be settled with a deficit corresponding to this rate of return.'[5] In practice, however, this rule has been breached in most years (Jafarov and Leigh 2007).

Intuitively it seems prudent to save the capital due to resource revenues for the future, while spending only the sustainable permanent return on that capital in each period. Barnett and Ossowski (2003: 47) put this viewpoint when they state that 'The long-run challenge for fiscal policy … reflecting a concern for intergenerational equity, should be met by targeting a fiscal policy that preserves government wealth –

[5] Statistics Norway, 'Focus on Public Finances: Petroleum Revenue', http://www.ssb.no/off_finans_en/read_more.html, accessed 20 October 2011.

appropriately defined, inter alia, to include oil.' The argument that an exhaustible resource should not be consumed but should be transformed into an income-yielding asset is appealing.

This argument is not in fact optimal, however, even under the assumptions of the PI hypothesis: the judgement of how much to save has to be made in the light of expectations of future levels of income and the stock of capital more generally. In particular, the higher the expected rate of per capita economic growth, the less it makes sense to defer consumption for the future. If it is optimal to smooth consumption over time, including across generations, then the fact that people will be richer in the future implies that people today should be consuming more of the finite resource revenues than people in the future. Moreover, while at first blush it may seem unfair for current generations to consume the value of finite natural assets, they will in any case leave most of their physical assets to future generations, in the form of the capital stock.

When we drop the assumption of a representative agent then this argument becomes even stronger for countries with significant levels of poverty. If our social welfare function is sensitive to extreme poverty, and we expect that growth will lift people above this poverty line in the future, then spending resource revenues on poverty reduction in the short term is likely to be optimal.

Some of these points can be made using standard economic analysis, as used, for instance, in the Stern Review (Stern et al. 2006). On this approach the future is discounted geometrically at a rate of

$$\delta + \theta g,$$

where δ is the subjective discount rate, θ the elasticity of marginal utility and g the rate of per capita consumption growth. Higher g means that consumption will be higher in the future in any case, implying that there is less reason to defer consumption today. Stern argues for $\delta = 0.1\%$[6] and, as we saw above, for $\theta = 1$, implying that a 1 per cent increase in income is valued at the same amount regardless of the level of income; other values have been argued for (see Beckerman and Hepburn 2007 for discussion). Higher

[6] Stern argues that, even if individuals discount their own future consumption, society should not discount the consumption of future individuals. On the other hand, he argues, there is some small risk of the extinction of the human species, implying a non-zero δ.

values for θ imply a higher aversion to inequality and correspondingly a stronger preference for smoothing income.

Though future consumption is discounted, deferring consumption and investing revenues gives a return; let *i* be the rate of return. This means that saving can provide more consumption in the future than we are giving up today. Then it is optimal to save any extra income, as opposed to consuming it today, if and only if

$$i > \delta + \theta g.$$

Thus saving for the future is more likely to be optimal the higher the expected return on investment, the lower the growth rate, and the less one cares about inequality and smoothing income. For a developing country with respectable growth rates and high levels of poverty, the discount rate will be high. This suggests that spending resource revenues today to alleviate poverty may be optimal. On the other hand, if invested well then the social return to investment may also be high, as I discuss below.

In arriving at an optimum there are two further issues to consider. First, one might expect investment to have diminishing marginal returns, so that *i* is declining as the level of investment rises. Second, macroeconomically significant levels of investment will lead to a rising *g*. Hence if $i > \delta + \theta g$ before any investment is made then revenues should be invested up to the point where *i* has declined and *g* has risen enough to equalize the two sides. Further revenues should then be consumed. If $i < \delta + \theta g$ to start with, then all revenues should be consumed. In general, there is no reason to assume that the optimal amount to consume will coincide with the PI due to the stock of the resource, so there is no reason to believe that the PI approach is optimal.

Supposing that some share of resource revenues is to be invested, what is the best way to do this? That is, what investment will give the best long-run return? Standard economic advice, typically given by the IMF, favours the use of sovereign wealth funds (SWFs). These are funds, like Norway's or Chile's, that invest abroad in a variety of financial instruments. The advantage of investing abroad is that the returns to an SWF are supposed to be uncorrelated with most shocks that hit the country.[7] So while a decline in copper prices will reduce Chile's copper revenues, it should not adversely affect the real

[7] 'Supposed to be' because in the financial crisis of 2008–9 almost all asset classes, including stock markets and commodities, declined at the same time.

return accruing to its fund. However, it has recently been argued (e.g. by Collier, van der Ploeg and Spence 2009; van der Ploeg and Venables 2010) that many developing countries can achieve higher social returns by investing domestically in infrastructure, public goods, education and other public services than by investing abroad.[8] This is particularly likely because the positive spillovers of such investments can imply that their total return to the country is higher than just the direct financial return. Moreover, many countries under-invest in these areas because of credit constraints, and resource revenues loosen this constraint.

On the other hand, domestic investment may be inefficient in practice. Robinson and Torvik (2005) discuss a range of examples of 'white elephant' projects that, they argue, should be understood as clientelistic payments by politicians to their supporters. Also, as mentioned above, bottlenecks may imply limited absorptive capacity, where too much investment may lead to inflation rather than increased output. Clearly, domestic investment should always be subject to thorough cost–benefit analysis to minimize these risks. But the point remains that there is no reason to assume that investment in international financial instruments will be optimal.

3.2. The distribution of resource revenues

How are resource revenues spent, and who benefits from them? As already discussed, the expenditure of resource revenues should be considered in the context of fiscal expenditures more generally. But what makes them different is that, unlike fiscal revenues funded by taxation of individuals and businesses, they have not been appropriated from anyone. Unlike standard fiscal revenues, therefore, there is a sense in which resource revenues are *distributed*, but not *redistributed*. However, I will use the term *redistribution* in the following way. I start from the assumption that every citizen has an equal claim to government resource revenues. Then if a policy implies that one subset of citizens benefits from the fiscal system by less than their population share of revenues, and another by more, this will be considered a *redistribution* away from the former and to the latter.

[8] This research is part of the background to the Natural Resource Charter, an organization set up to establish norms and guidelines for resource-rich countries.

This can be significant, as Segal (2010) finds in the case of Mexico. Since 2005, hydrocarbon revenues received by the government have comprised 7.9–10.5 per cent of GDP and 31–41 per cent of government revenue. Mexico's fiscal system is progressive at first glance: poorer households receive more in benefits (including benefits in kind such as health and education services) than they pay in taxes, and vice versa for richer households. But when one takes account of the fact that every Mexican starts off entitled to her or his per capita share of government oil revenues, it is clearly regressive: in 2008, households in the bottom 90 per cent of the income distribution received net benefits worth less than their share of oil revenues, while those in the top 10 per cent received more. That is, the net effect of Mexico's fiscal system was to transfer oil entitlements from the bottom 90 per cent to the richest 10 per cent.

In analysing the distributional impact of fiscal policy it is necessary to define different senses in which a policy can be *progressive* and *regressive*. A policy is *relatively progressive* if it reduces the relative or proportional difference in incomes between the poor and the rich. Thus a benefit that raises the incomes of the poor by 10 per cent and raises the incomes of the rich by 5 per cent is relatively progressive because it reduces the ratio of incomes of the rich to the poor. Similarly, a tax of 10 per cent on the rich and 5 per cent on the poor is relatively progressive. A policy that is strictly relatively progressive will necessarily lower inequality according to all standard (Lorenz-consistent) inequality measures, while a policy that is relatively regressive will raise inequality by these measures.

A policy is *absolutely progressive* if it reduces the absolute difference in income between rich and poor. Thus a benefit that gives $10 to each poor person and $5 to each rich person is absolutely progressive, as is a tax that takes $10 from the rich and $5 from the poor. If it increases the absolute difference then it is absolutely regressive.

A common way to pass resource rents on to citizens is to use them to substitute for existing taxes. Bornhorst, Gupta and Thornton (2008) find that on average countries tend to reduce the collection of non-resource revenues (both taxes and other sources of income) by 0.2 percentage points of GDP for every 1 percentage point of GDP they receive in resource revenues. The benefits of lower taxes accrue to individuals according to how their own tax burden declines. Eliminating taxation altogether, for instance, is not

a distribution-neutral policy if the taxes being eliminated are not distribution-neutral. Where taxes are or would be relatively progressive, a proportionally uniform tax reduction is regressive, and vice versa.

In the remainder of this section I discuss the expenditure side of fiscal policy. I first consider two common routes through which governments channel resource rents to citizens: fuel subsidies and public employment. I then discuss policies that involve more direct means of distributing resource revenues.

3.2.1. Fuel subsidies

Fuel subsidies are a common and very popular policy in hydrocarbon-rich countries, where the population typically feels a sense of entitlement to hydrocarbons. Baig et al. (2007) find that net oil exporters tend to pass through much less of fuel price rises to consumers than do net fuel importers. For gasoline, kerosene and diesel Baig et al. find that net oil exporters passed through only 0.46, 0.43 and 0.7 times the rise in international prices over 2003–6. These compare with 1.09, 0.91 and 1.15, respectively, for net oil importers.

The popularity of fuel subsidies is not deserved, however: they are both highly inefficient and in most cases also regressive. Their inefficiency is easy to see if one considers the simple experiment of exchanging $1 of fuel subsidy for a cash transfer of $1. With the cash one can choose to spend the $1 on fuel, in which case one is in the same position as with the subsidy. But one can also choose to spend some share of the $1 on something else. The fuel subsidy implies forced expenditure on fuel as opposed to on other goods and services that might be preferred.

The costs of subsidies can be very high. In Mexico in 2008 they rose to 1.8 per cent of GDP (Segal 2010). For 2005 Coady et al. (2006) estimated them at 12.7 per cent in Azerbaijan, 3.1 per cent in Bolivia, 3.6 per cent in Ecuador, 4.1 per cent in Egypt, 3.2 per cent in Indonesia, 5.8 per cent in Jordan and 9.2 per cent in Yemen.[9]

In addition to being inefficient, fuel subsidies also tend to be regressive because richer people tend to spend a higher share of their incomes on fuel, largely because richer

[9] Note that these figures are costs to the government, but do not represent the value of lost GDP due to the inefficiency of subsidies. The net loss in value is smaller because, while $1 spent on fuel subsidies is worth less to a household than $1 in cash, it is nonetheless worth significantly more than nothing.

people are more likely to own cars (Coady et al. 2006). In Mexico in 2006, for instance, over 70 per cent of the benefits of fuel subsidies went to the top 30 per cent of the population. This made the subsidies clearly regressive in absolute terms. Moreover, the subsidies were regressive even in the relative sense because the top 30 per cent received about 60 per cent of total income, net of fiscal policy – so their share of the fuel subsidy was even higher than their share of income (Segal 2010).

The distributional impact depends to some extent on which fuels are subsidized. Kerosene, for instance, tends to be used more by the poor than by the rich, whereas the opposite is true for gasoline. Coady et al. (2006) estimate the share of total fuel subsidies received by the bottom 40 per cent (Table 1). The fact that the share received is always below 40 per cent implies that the subsidies are absolutely regressive. Moreover, in Bolivia, Mali and Sri Lanka richer quintiles spend a higher share of their income on fuel, suggesting that subsidies are also relatively regressive in these countries (Coady et al 2006: 16).

The popularity of fuel subsidies is presumably based on the assumption that their elimination will not be compensated through other fiscal means. Indonesia in 1998 and Venezuela in 1989 faced riots when the government attempted to raise the price of gasoline, although other countries have had more success in explaining the benefits of reform to their populations (Bacon and Kojima 2006). Below I discuss Iran's ongoing efforts in this area.

Are subsidies always a bad way to spend money? There are two potential arguments in their favour, but neither applies to fuel. The first applies to goods or

Table 1. *Share of fuel subsidies received by the bottom 40 per cent*

Country	Share of fuel subsidies received by bottom 40 per cent (%)
Bolivia	15.3
Ghana	23.0
Jordan	21.2
Mali	23.9
Sri Lanka	25.1

Source: Coady et al. (2006: 13).

services with a positive externality, such as investment in technology. Since fuel consumption has strong negative externalities due to environmental pollution, this argument certainly cannot be used to justify fuel subsidies. On the contrary, the negative externalities justify taxation rather than subsidy, and this partly explains why so many fuel importers impose taxes on fuel.

The second potential argument is that a subsidy can be a *second-best redistribution*: if we want to get income to a subset of the population, but targeting them directly with cash transfers is costly, then subsidizing some good that they use a lot of can be a form of indirect redistribution. This may apply to subsidizing basic foodstuffs as a poverty reduction strategy. If the rich consume a larger absolute quantity of the subsidized good then the subsidy will remain regressive in the absolute sense, but it will be progressive in the relative sense as long as they spend a lower *share* of their income on it than do the poor. Again, however, this does not apply to fuel: we have seen that fuel subsidies tend to be regressive in both absolute and relative terms.

3.2.2. Public employment

A second common way to spend resource revenues is through employment creation, including public employment. Karl (1997: 27) argues that 'programs of employment creation' were a significant part of the reaction of Latin American oil exporters to the rise in oil prices in the 1970s, and that 'in each country, middle classes made up of state employees, small shopkeepers, and skilled laborers grew rapidly, fostered by oil-fuelled economic dynamism'. El Katiri, Fattouh and Segal (in press) argue that Kuwait uses public employment and public pensions as the primary means of distributing resource rents to the population. A job in the public sector is guaranteed to Kuwaiti nationals and comes with attractive salaries and benefit packages, explaining the fact that 91 per cent of the Kuwaiti national labour force works in the public sector, while 98 per cent of private sector jobs are occupied by non-Kuwaitis.

There is a widespread perception that jobs so created tend to be unproductive. In private discussions observers of Kuwait, including Kuwaiti nationals, often claim (and complain) that many Kuwaiti public employees do essentially nothing in return for their wage. Morality aside, the problem with distributing rents through unproductive public employment is that it has a high opportunity cost: people who could be doing productive

work elsewhere are attracted into unproductive public sector jobs because of the benefits they receive, funded by resource rents. Individual Kuwaitis do not in fact have the option of working productively while also receiving their full share of resource rents, because in order to receive the rents they have to spend office hours doing an unproductive job. Kuwaitis face the following choice: be unproductive in the public sector and be rewarded with oil rents, or be productive in the private sector and not be rewarded with oil rents. It would be more efficient to give Kuwaiti nationals their wage, or their share of rents, unconditionally and allow them to take up another, productive, job in the private sector – which is one way of seeing direct revenue distribution, a policy I discuss below.

Another example is Mexico's refineries, owned and run by the national oil company Pemex. These refineries are among the least efficient in the world, partly because they employ six times as many people as US refineries of comparable size and complexity, without higher levels of production.[10] It appears that most of these employees are not being productive, but political pressures and the strength of the Pemex union preclude any reduction in the workforce.

3.2.3. Direct distribution

The conceptually simplest way to distribute resource revenues to the population is as an equal, universal and unconditional cash transfers. Such a policy, also known as a *resource dividend*, has several advantages (Segal 2011).[11] First, since all citizens receive their per capita share of government resource revenues we can be sure that the distribution of the benefits of these revenues is fair: since the resource belongs to all citizens, it is appropriate that all should receive an equal share.

While this implies that the resource dividend is not explicitly a poverty reduction scheme, Segal finds that it would have a large impact on poverty: if all developing countries adopted it globally, then global poverty at the purchasing power parity (PPP) US$1-a-day line would be better than halved. Even in some countries that are not particularly resource rich but have a lot of poverty – such as India, where resource rents comprise around 5 per cent of GDP – poverty would be approximately halved. Such a

[10] These data are from proprietary surveys produced by Salomon and are not publicly available.
[11] Moss (2011) discusses the idea in the context of existing cash transfer schemes in developing countries, and as part of a project at the Center for Global Development on direct distribution.

policy may therefore be a component of a poverty reduction strategy. Moreover, Segal argues that such a universal scheme may even be more effective at reducing poverty than a targeted scheme because targeted benefits often fail to reach their intended recipients.

Second, a resource dividend is the easiest form of expenditure to make transparent: once the media and population know the total quantity of resource revenues, and the size of the population, they know how much each individual should receive. It makes it very easy for citizens to know whether they are receiving their due, and such transparency is likely to reduce 'leakage', or theft of revenues before they reach their intended recipients (Gauthier 2006). Third, removing revenues from government expenditure budgets eliminates some standard mechanisms of corruption such as over-bidding for contracts. Finally, unlike the salaries paid to unproductive workers discussed above, or targeted benefits that are conditional on low income, a resource dividend is not *distortionary* in the economic sense: since it is unconditional, it does not give any incentive for inefficient or unproductive behaviour.

It has also been argued that direct distribution will reduce the risk of the *resource curse*, or the proposition that natural resource wealth has deleterious effects on a country's economy, politics and institutions. Karl (1997) makes the argument that resource wealth leads to unaccountable and ineffective government institutions because the ease of collecting resource revenues implies that governments do not need to create the bureaucracies, administrative capacity and systems of conflict resolution that are required to collect taxes from the non-resource economy. In addition, the lack of taxation may help to sustain non-democratic and rent-seeking governments because untaxed citizens are less likely to demand government accountability (Ross 2004; Mehlum et al. 2006; Prichard 2010).[12] Regarding corruption, Gelb and Associates (1988: 17) write that 'a large rent component in national income, if not rapidly and widely dispersed across the population, is liable to divert scarce entrepreneurial talent away from commodity production into "rent-seeking" activities'. By delivering resource rents directly to citizens, forcing government to raise taxes in the usual way, direct distribution may reduce the risk of these outcomes.

[12]Haber and Menaldo (2009), on the other hand, find that natural resource wealth is not associated with a lack of democracy.

It increases the risk, however, that the government may not be able to raise the tax revenues required to provide optimal levels of expenditure on infrastructure, public goods and public services. Baunsgaard and Keen (2005) find that developing countries that reduce trade tariffs are usually unable to fully compensate for the lost revenue through other taxes, suggesting that governments face constraints on how much tax they can raise. In this case, keeping resource revenues on the government budget removes a constraint with a high shadow price.

Direct distribution does not preclude smoothing: as with resource revenues more generally, a stabilization fund may be used to reduce the volatility of the dividend. As discussed below, the Alaska Permanent Fund Dividend is a direct payment based on a five-year moving average of income accruing to the fund. Since the dividend depends on the income earned by the fund, rather than oil revenues, there is no correlation between the dividend and oil prices. Moreover, averaging over five years implies some smoothing even relative to the fund's income.

I now consider three policies that are forms of direct distribution, in Bolivia, Iran and the US state of Alaska.

3.2.3.1. Bolivia: Bonosol and Renta Dignidad

Bolivia's primary export is gas, and hydrocarbon revenues ranged between 26 and 42 per cent of total government revenues from 2004 to 2010, while the hydrocarbon sector has comprised between 5.0 and 6.5 per cent of GDP. The *Renta Dignidad* scheme is a universal pension funded by hydrocarbons, begun in 2008, which developed from the *Bono Solidario*, or *Bonosol*, created in the mid-1990s. Bonosol was created as part of the privatization (referred to as 'capitalization') of major national companies, including the national hydrocarbon company YPFB, and other reforms implemented by President Gonzalo Sánchez de Lozada over the years 1993–7. It was intended as a mechanism for distributing the proceeds of the privatizations to the population, and was implemented at least partly to reduce political opposition. As Whitehead (1997: 15–16) puts it, 'the capitalization formula was evidently designed with … political economy constraints in mind'.

Bonosol was a pension of 1,800 Bolivianos (currently about US$260) a year, paid to all citizens over the age of 65 who had already reached age 21 by the end of 1995.

Thus it was not conceptualized as a universal pension based on the inherent merits of such a benefit, but rather as compensation for the sale of a national asset. It was correspondingly aimed only at those Bolivians who were adults by the time of the privatizations, and would expire with those Bolivians.

Its actual lifetime was considerably shorter, however. It was initially paid in only one year, 1997, before Sánchez de Lozada's successor, President Hugo Banzer, declared it unaffordable. On his return to the presidency Sánchez de Losada attempted to bring it back in 2003, but was unable to finance it as originally planned owing to continuing poor returns from the capital raised through the privatizations. Nonetheless, by getting money from alternative sources it continued to be paid through to 2007 (Müller 2009).

Bonosol was officially dropped in 2008 by the government of Evo Morales, to be replaced by the new Renta Dignidad. Renta is also a universal pension, but it differs from Bonosol in several key respects. First, unlike Bonosol it is conceptualized as a universal pension with no projected sunset period, and is explicitly linked to hydrocarbons rather than privatizations. It is financed by a fixed share (30 per cent) of the Impuesto Directo a los Hidrocarburos (IDH), or Direct Hydrocarbon Tax. It is described by the Bolivian Ministry of Autonomy (2008), in implicit contrast to (and criticism of) Bonosol, as follows: 'It is the concrete result of the nationalization of our natural resources. These resources now go directly to the hands of those who most need them. It is a sustainable measure that does not represent the privatization of national companies nor the loss of our natural wealth and patrimony.'

Second, it lowers the age at which Bolivians start to receive it from 65 to 60. Third, the payment remained the same for those who have some other source of pension in addition, but was raised by 25 per cent to Bs2,400 (about US$340 or PPP$860[13]) per year for those with no other pension. A further important practical difference is that Bonosol had to be collected from branch offices of the pension scheme, which entailed significant collection costs for many poor people living far from urban areas, while the Renta Dignidad is also distributed by fixed and mobile military units (Müller 2009: 168).

Renta Dignidad cost 1.4 per cent of GDP in 2008 and 1.5 per cent in 2009 (IMF 2010: 6). Poverty was reported to have been reduced by 4.8 percentage points in 2008,

[13] Using the IMF's World Economic Outlook estimated PPP exchange rate for 2010 of Bs2.8/PPP$.

but systematic analyses of the impact of the policy on poverty and inequality do not yet seem to be available. However, its magnitude is probably sufficient to eliminate poverty among the over-60s at the World Bank's higher US$2-a-day international poverty line.[14]

3.2.3.2. Iran: subsidies and direct distribution

Iran is a major producer of oil. Oil revenues provided about 70 per cent of fiscal revenues over 2006–9 and 18–22 per cent of GDP (IMF 2010: 20). Fuel and other goods have been heavily subsidized, with the price of a litre of gasoline only about 10 US cents in recent years. However, in January 2010 the Parliament passed a bill to phase out these and other subsidies over five years, planning to replace them in part with universal cash transfers to the population (Tabatabai 2010). On 20 December 2010 the subsidies were cut, with petrol prices nearly quadrupling to 38 US cents per litre (Yong 2010). Households were given a one-off cash payment of about US$80 each to compensate and promised double that amount next year (Bozorgmehr 2010).

Under the government's long-term proposal, transfers are supposed to total US$50 billion annually, or nearly US$60 per person per month. One motivation given for the proposed cash transfer is to make it politically easier to withdraw the subsidies: it is 'justified and perceived as a means of compensating the population for the removal of subsidies to which they have become accustomed. Many view cheap oil as a benefit to which they are entitled as a major oil producing nation, and the metamorphosis from price subsidies to cash transfers is seen as merely a change of form in that entitlement' (Tabatabai 2010: 7). Whether the one-off cash payment will evolve into the planned long-run system of transfers remains to be seen.

3.2.3.3. Alaska: the Permanent Fund Dividend

The US state of Alaska has a state-owned fund, called the *Alaska Permanent Fund*, that by law receives at least 25 per cent of the oil royalties received by the state government. Each year a dividend from this fund is given to all those have resided in the state for at least one calendar year. The dividend is calculated as 52.5 per cent of the Fund's nominal income (not including the share of oil royalties that has been added to the Fund) averaged

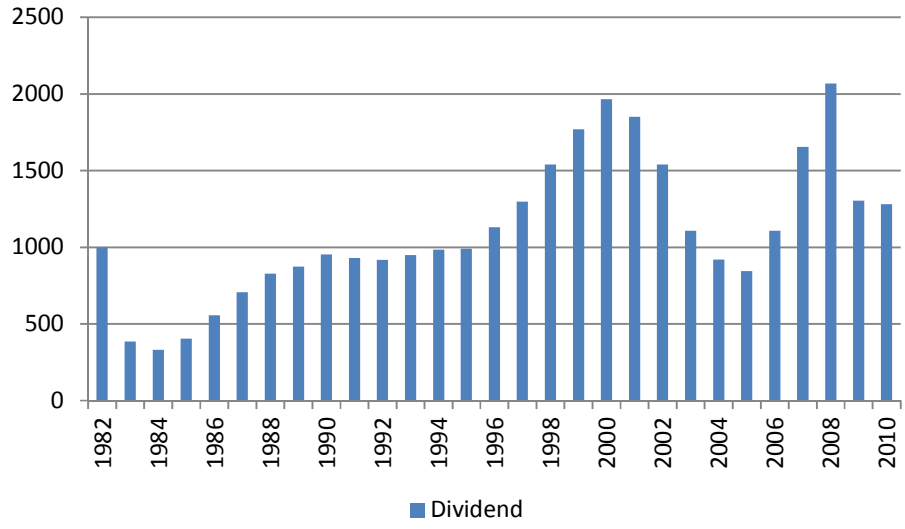
[14] This poverty line is actually US$2.50 in 2005 PPP$.

over five years, divided by the number of eligible recipients.[15] In most years it has lain between US$800 and US$2,000 (Figure 1). It is thus not really a direct distribution of oil revenues, but a cash payment financed by the return to an oil fund.

Since the state continues to pay royalties into the Fund, and will for as long as oil revenues flow, the dividend is a version of the BIH policy discussed above: it is based on revenues due to oil that has already been extracted, and gives no advance on the value of the oil that is yet to be produced. For this reason one would expect the Fund and the dividend to grow over time. The Fund has indeed been growing (Figure 2 on p. 24, where data are available only from 1995), but the dividend has been more volatile and the trend is less clear (Figure 1).

It is difficult to identify the impact of this policy on the distribution of income, but the dividend may partly explain the fact that in 2007 Alaska had the joint second lowest poverty rate of all the states of the USA, despite having only the nineteenth highest per capita personal income (Segal 2011).

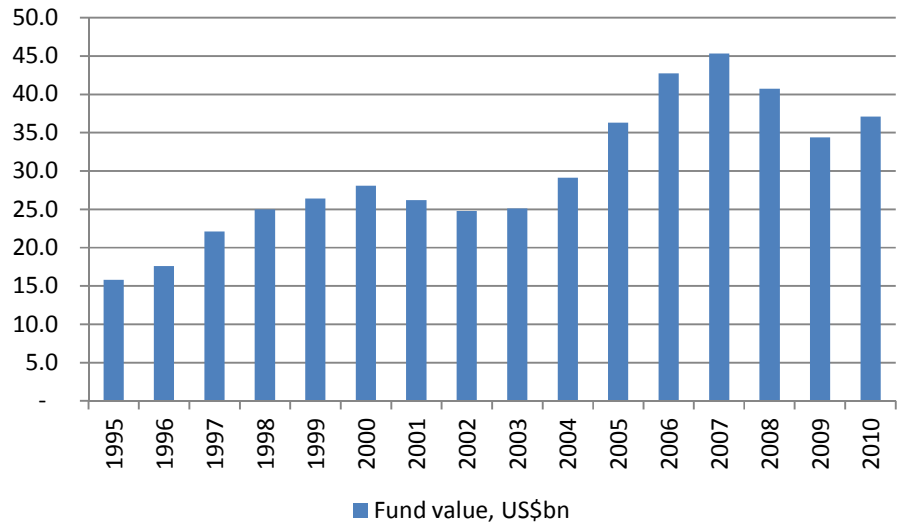
Figure 1. *Alaska Permanent Fund dividend, current US$*



Source: http://www.apfc.org/home/Content/dividend/dividendamounts.cfm, accessed 20 October 2011.

[15] Alaska Permanent Fund Corporation website: see http://www.apfc.org/home/Content/aboutFund/aboutPermFund.cfm and http://www.apfc.org/home/Content/dividend/dividend.cfm, accessed 20 October 2011.

Figure 2. *Alaska Permanent Fund, value in current US$bn*



Source: Alaska Permanent Fund Corporation, Annual Report (various years), http://www.apfc.org/home/Content/publications/reportArchive.cfm, accessed 20 October 2011.
Note: Total liabilities and fund balances (reported as 'Total liabilities, principal and earnings reserve' for 1995–2000).

4. ECONOMIC MECHANISMS: THE 'TRICKLE DOWN' OF RESOURCE REVENUES AND THE RESOURCE CURSE

While the greatest impact of resource revenues on households works through fiscal policy, resource revenues have some impact on the economy almost independently of what they are spent on. In the mechanisms discussed here, the only assumption is that when income rises due to the resource, demand rises for both tradable and non-tradable goods. The mechanisms do not depend on who in particular receives the direct benefits of the resource. So they would be equally consistent with the standard case of revenues financing government expenditures, and with the extreme case of one private individual receiving and spending all of the revenues on himself – as long as he spends some of it on non-tradables such as the construction of mansions and domestic service.

It is the rise in demand for non-tradables that causes the best-known side effect of natural resource discoveries, namely Dutch Disease, or a rise in the real exchange rate caused by the increase in resource exports. This is usually lamented as causing a loss in competitiveness of non-resource exports, including manufacturing. However, what is rarely appreciated is the fact that manufacturing becomes uncompetitive only because the

returns to domestic factors of production, such as wages, have risen. That is, manufacturing becomes uncompetitive only if its costs rise, and its costs rise only if the labour and capital inputs have started to demand higher payments. So it occurs only if citizens have become richer.

The economic processes underlying these changes are examined in a trade-theoretic context by Corden and Neary (1982) and using duality theory by Neary (1988). Corden and Neary identify two economic mechanisms whereby a resource discovery affects the rest of the economy in general equilibrium. The first is the 'spending effect', which refers to the effect of the rise in aggregate income and hence expenditure. Some of this income will be spent on tradables, whose prices, we assume, are fixed by international markets. But, as mentioned above, some will be spent on non-tradable goods and services. Since the resource discovery does not change the supply curve of non-tradables, the increase in demand for non-tradables implies that their price must rise relative to tradables. That is, the spending effect leads to a rise in the real exchange rate, defined as the cost of non-tradables relative to tradables or, equivalently, the average cost of domestic output relative to international prices.

This rise in the relative price of non-tradables is a core reason why output of manufacturing and other non-resource tradables is likely to decline: the price rise draws factors of production (labour and capital) out of these tradables and into the non-tradable sector. To illustrate, the rise in demand for non-tradables might imply a rise in demand for construction and transport. This will raise real wages paid in these sectors, and workers that were producing tradable manufactured goods will be attracted away from the factory and into construction or transport. The factory owner cannot afford the higher real wage to keep the workers because he has to compete with imported manufactured goods, so he produces less, and marginal producers will go out of business. This is bad for the factory owner, but good for the workers who have got higher-paid jobs elsewhere – and also good for business owners in the non-traded sectors.

The second mechanism, which we may call the 'factor movement effect',[16] occurs only if the resource sector uses a significant share of domestic factors of production. If

[16] Corden and Neary call it the 'resource movement effect', where 'resource' means factor of production, but I choose the alternative term to avoid confusing this sense of 'resource' with the natural resource.

this is so, then it increases demand for those factors of production, again drawing them from the rest of the economy. Corden and Neary (1982) show that the precise effect on both the structure of output and on factor payments will depend on the structure of the economy, and generalizations are not possible. However, since resource sectors typically employ at most a very small share of domestic labour and capital, this second effect is likely to be small compared to the less ambiguous spending effect.

In sum, through the general equilibrium effects, the rise in national purchasing power due to natural resources would be expected to raise household incomes to some extent even if citizens do not benefit directly from resource revenues.

Karl (1997: 28) displays a very common misunderstanding of the economics of the Dutch Disease. She correctly observes that real exchange rate appreciation in oil exporters in the 1970s 'cheapened imports and undermined local production'. But she then states that 'in this way, the extensive reliance on imports, which was once aimed at plugging conjectural gaps between demand and supply in the aftermath of the boom, became a semipermanent and ultimately expensive feature of oil economies'. The idea that semi-permanent reliance on imports should be expensive, or otherwise regrettable, is a confusion: if one's exports increase in value, then one's imports have to increase in value similarly. Essentially, it has become more efficient for the country to produce more non-tradables and fewer non-resource tradables, and instead to import more tradables using oil revenues.

While there is nothing wrong in the short term with producing fewer manufactured goods if you can instead import more of them, it has often been argued that in the longer run deindustrialization leads to lower growth. The argument is that manufacturing encourages learning by doing, and promotes backward and forward linkages, while the resource sector and non-tradables do not (van Wijnbergen 1984; Sachs and Warner 1995, 1997).

This is a standard argument for the economic version of the 'resource curse', the proposition that having a large natural resource sector leads to lower economic growth (Sachs and Warner 1995, 1997; Sala-i-Martín and Subramanian 2003). This is independent of the institutional argument, discussed above, that resource wealth leads to unaccountable and ineffective government institutions. Other research, however, has

contested the finding that there is any association between resource wealth and economic growth (Ding and Field 2005; Stijns 2005; Brunnschweiler 2007; Brunnschweiler and Bulte 2008).

There is therefore no consensus on whether natural resources lower growth, but there is consensus that they raise the real exchange rate, and that this should raise average household incomes independently of whether they enjoy the direct benefits of resource revenue expenditures.

5. CONCLUSION

Natural resource revenues and their expenditure have to be considered in the light of fiscal policy more generally. But they deserve special treatment both because of their distinctive time profile, being both volatile and exhaustible, and because of their legal and political status.

There is a strong argument for smoothing out the volatility of resource revenues in order to avoid volatile government expenditures. Beyond this, how to spend these revenues depends on the circumstances of the country. Two sets of decisions have to be made: how to divide revenues between current consumption and investing for the future; and what to spend on, or invest in. Collier et al. (2009) and van der Ploeg and Venables (2010) argue that many developing countries are likely to do better investing in domestic capacity rather than in foreign financial markets, but in making such a judgement one has to consider political barriers to efficient investment, and possible capacity constraints.

I have also argued that current consumption, particularly through spending on policies that reduce poverty, may be optimal from the point of view of the intertemporal optimization of social welfare: once we drop the convenient fiction of a representative agent, the fact that many people are extremely poor implies that there can be no better way to spend resource revenues than on policies that alleviate poverty. The higher the expected rate of economic growth, the more likely expenditure on current poverty reduction is to maximize intertemporal social welfare, because future generations are expected to be richer in any case.

Citizens of resource-producing countries rightly feel that their natural resources belong to them, and that they have the right to benefit from them. But even those

revenues that flow without leakage from the resource to government expenditures can fail to benefit citizens to the extent that they should. Fuel subsidies are widespread and both highly inefficient and usually regressive. Swelling the ranks of public sector employees can also be an inefficient way to spend resource rents when there is no work for the employees to do. The most parsimonious form of rent distribution is through unconditional direct transfers, which are easy to make transparent and are non-distortionary, avoiding the economic inefficiencies of the more common forms of expenditure. Moreover, despite their universality, they have the potential to be highly poverty reducing. Bolivia's universal pension, funded by hydrocarbon revenues, is currently the closest to such a policy, and may be a useful benchmark for countries for which a fully universal transfer would seem too radical.

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