# Contribution of Mega-Projects to GPD in Mozambique

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## Sumário

Os indicadores mais recentes do African Development Indicators (Banco Mundial 2007) apresentam Moçambique como sendo a economia africana com rápido crescimento . O ADI publicou que em média a taxa de crescimento do PIB entre 1996 à 2005 foi de 8.3 porcento ao ano, tendo sido excedido somente por três países exportadores de petróleo, nomeadamente Guiné Equatorial, Chade e Angola.

Os países exportadores de petróleo encontram-se num grupo a parte, pois a produção de petróleo é considerada uma actividade ilha e com relativamente poucas ligações com a economia doméstica .

Contudo, actividades ilha, particularmente a produção de alumínio e a produção do gás natural, sem dúvida contribuiram para o crescimento económico de Moçambique.

Com o presente trabalho, propomo-nos a estimar o impacto directo dos mega-projectos no PIB, usando macro-dados.

Na análise, focaremos os efeitos directos dos mega projectos ignorando os efeitos secundários ou indirectos.

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## 1 Introduction

The most recent *African Development Indicators* (World Bank, 2007) listed Mozambique as the fastest growing diversified African economy. The ADI reports an average GDP growth rate between 1996 and 2005 of 8.3 percent per year, only exceeded by three oil exporting countries: Equatorial Guinea, Chad and Angola. Oil exporters are set in a separate group as oil production is considered an island activity with relatively few linkages to the domestic economy other than tax revenue. However, island type activities, particularly in aluminium and gas production, have without doubt contributed to economic growth in Mozambique.

Using macro-data we estimate the direct impact of mega-projects on GDP at factor cost (GDPFC). We define mega-projects to be the aluminium smelter (Mozal in Maputo province), the gas extraction and pipeline project (Sasol or the Temane gas projects in Inhambane), and the titanium ore or heavy sands project (Moma in Nampula). We exclude public goods mega-projects operating in 2006, such as road construction (N4 or Maputo-WitBank) and electrification projects (Cahora-Bassa and Mepanda Uncua) as these projects are not unique to Mozambique – all countries construct roads and produce electricity. Two other private good projects are also considered megaprojects; the Moatize coalmine in Tete and Corridor Sands in Gaza, but in 2006 these were in a prefeasibility phase and were therefore not generating value added.

## 2 Basic Concepts

GDP is defined as the total market value of all final goods and services produced within a country during a given period of time. Most commonly, GDP is measured using the expenditure method:

$$\text{GDP} = \text{Consumption} + \text{Investment} + \text{Government spending} + (\text{Exports} - \text{Imports}). \quad (1)$$

Another way of measuring GDP, and the approach we are using here, is to measure total remuneration to employees for work done and surplus (profits) to owners of firms. This is called total factor income, and measures the value of GDP at factor cost (GDPFC). By definition, the difference between GDP at factor cost (or factor prices) and GDP at market value (used in the expenditure calculation above) is the value of indirect taxes. Taxes levied on commodities or activities, such as value added taxes, import tariffs, and production subsidies (a subsidy is defined as a negative tax) are indirect taxes. The formula for measuring GDP using the income approach is therefore:

$$\text{GDP} = \text{GDPFC} + \text{indirect taxes} \quad (2)$$

We measure the contribution of mega-projects by measuring their contribution to GDPFC. Consequently, we are measuring mega-projects' contribution to GDP and GDP-growth without indirect taxes paid by the projects. The mega-projects considered are 100% export oriented; hence they pay no value added tax. In addition, mega-projects typically pay very low or zero tariff rates on their imported intermediates. Mozal does pay a 1% turnover tax. Overall, we believe that GDPFC is a reasonable measure, which, if anything, may slightly overstate the contribution to GDP growth.

In the analysis, we focus on direct effects of mega-projects ignoring all secondary or indirect effects. Usually, economic theorists will argue that there are forward and backward linkages of any major investment or any mega-project. That is, second-order effects come about since workers will gain by supplying labour and subcontractors will gain by delivering goods and inputs to these companies. Also, these mega-projects demand and pay for better infrastructure, which first of all, is deducted in their tax payments but secondly will have some local benefits for the people of the region and other smaller companies. Examples of the latter are among others, when Mozal build schools or tries to reduce malaria in the Beluluane Industrial Park, or when Sasol, as part of its contract with the Mozambican state, invests US$5 million into several community projects, such as, construction of schools, clinics and sport facilities, provision of clean water supplies and support of agricultural projects. As an example of the former, Mozal employs around 1300 workers, and Sasol employed up to 2400 people during construction of the pipeline.[1]

The decision to ignore indirect effects is reasonable for the purposes of this study due to the nature of mega-project investments. The mega-projects are foreign owned, capital intensive projects that rely heavily on imported intermediates and export 100% of production. Under these circumstances, linkages to the domestic economy will be small, which is the principal finding of Andersson (2001). A possible link is tax revenue. However, the mega-projects enjoy significant reductions in income and commodity taxes and are also allowed tax deductions from their expenditure on infrastructure and training of employees. For example, for Mozal, Moma and Corridor Sands, the standard income tax of 32% has been replaced by the 1% *taxa liberatória* mentioned above. For SASOL, the standard income tax rate was dropped to 17.5% (Kuegler, 2008, and Andersson, 2001). After deductions, tax contributions by mega-projects are quite low. In sum, the analysis of direct contribution of mega-projects to GDPFC is likely to be a quite reasonable estimate of the contribution of mega-projects to GDP.

## 3 Method

To calculate the growth rate contribution of mega-projects, we take a very simple but effective approach. In 1996, we know that the contribution of mega-projects to GDPFC was zero since none of them had started construction yet (see timeline for mega-projects in Appendix A). By 2006, Mozal and Sasol were, respectively, producing aluminium and extracting gas, and Moma was in a construction phase. Thus, by subtracting the value-added in production of Mozal aluminium, Sasol gas extraction as well as value-added in construction of titanium mines from total GDPFC in 2006, we end up with GDPFC without mega-projects. From these three measures of GDPFC we can calculate the growth rate between 1996 and 2006 with and without the *direct* contribution of projects.

To see this formally let $GDPFC_{1996}$ and $GDPFC_{2006}$ be total GDP at factor cost (in constant prices) in 1996 and 2006, respectively and let $GDPFC(-)_{2006}$ represent GDP at factor cost minus the contribution of mega-projects (also in constant prices). Then, the average annual growth rate of GDPFC excluding mega-projects, defined as $r$, between 1996 and 2006 is calculated, by isolating $r$ from the formula:

[1] http://www.sasol.com/sasol_internet/frontend/navigation.jsp?navid=4&rootid=4&articleId=8500001&pnav=search&cnav=press%20releases.

$$GDPFC_{1996} \cdot (1+r)^{10} = GDPFC(-)_{2006}$$

$$\Updownarrow$$

$$r = \left( \frac{GDPFC(-)_{2006}}{GDPFC_{1996}} \right)^{1/10} - 1$$

To estimate GDPFC without mega-projects, $GDPFC(-)_{2006}$, we need value-added of these projects in 2006. For Mozal and Sasol these can be obtained directly from national accounts by sectors since Mozal is the only producer of aluminium and Sasol is the only major extractor of gas. Thus, for these two producers, we subtract from total GDP at factor cost in 2006 ($GDPFC_{2006}$), value-added (*valor acrescentado bruto*) of respectively, the aluminium industry (*indústria de aluminio de base*) and gas extraction industry (*indústria de extração de gas natural*).

Numbers for value-added of construction of the titanium mines are less precise. Unfortunately, precise value-added figures for construction of mega-projects do not exist. INE reports value-added figures for construction divided between construction by formal sector firms and private (or informal) construction. For 2006, we can bound the value added of titanium mine construction from above by the total value-added contribution of formal sector construction. We can also bound the value added of titanium mine construction from below by assuming the value is zero. The former value is obviously too large and the latter measure is obviously too small. The true direct contribution of mega-projects to GDPFC must fall within this range.[2]

In Table 1 and Figure 1 are listed GDPFC figures for the country as a whole and for mega-projects separately, according to the definitions just described. To facilitate comparison across years all numbers are reported in constant 2003 prices. From Table 1, consider first mega-projects share in GDPFC, that is, the share of value added to the economy by mega-projects. In 2006 mega-projects accounted for close to 13MT billion, slightly more than 10 percent of total GDPFC, which is similar to the combined share of the education sector, health sector and public administration and defence, or about half the value-added of the agricultural sector (*agricultura*).[3] Among mega-projects, Mozal is by far the biggest contributor of value-added, accounting for at least two thirds of all mega-projects value-added in 2006.

[2] Due to the large share of imports in construction of mega-projects, the assumption of zero contribution of formal construction is likely closer to the true value than the assumption of 100%. Andersson (2001) estimated the share of non imports in total construction cost of mega-projects to be around six percent. Substantial value added is generated for formal sector construction of schools, roads, houses, and office buildings.

[3] The combined value-added of education sector, health sector and public administration and defence was in 2006, 11.977MT million, whereas agricultural value-added was estimated at 25.126MT million. Both figures are in 2003 prices.

**Table 1: GDP at Factor Cost with and without Mega-Projects.**

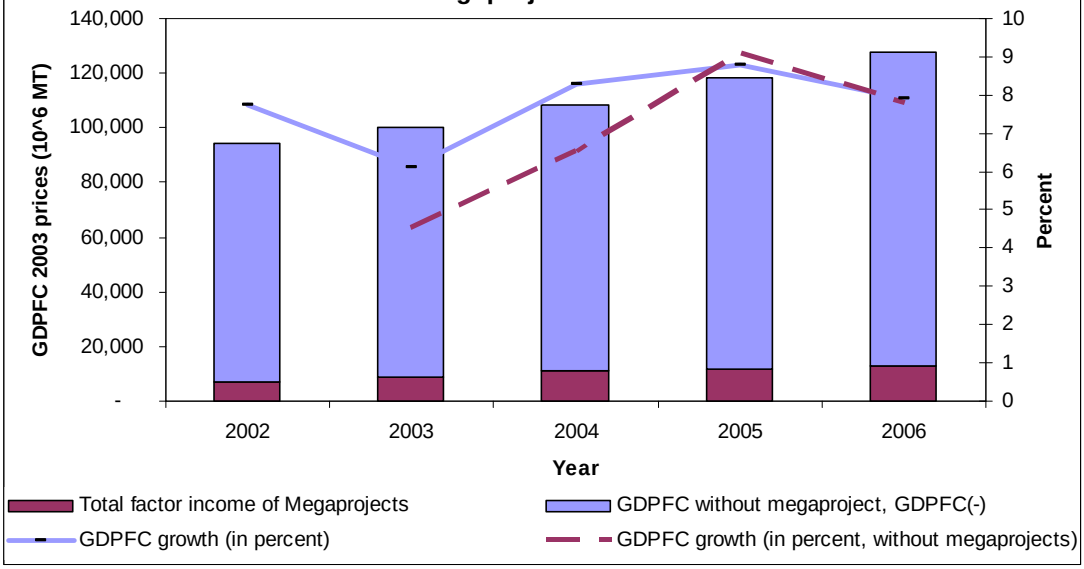
| | | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Values in constant 2003 prices (10^6 MT) | | | | | | | | | | | | |
| | GDP | 62,181 | 69,074 | 77,244 | 83,707 | 84,989 | 95,404 | 104,212 | 110,973 | 119,722 | 129,764 | 140,101 |
| | GDP at factor cost (GDPFC) | 57,042 | 63,342 | 70,673 | 76,959 | 77,724 | 87,774 | 94,574 | 100,341 | 108,646 | 118,173 | 127,532 |
| | Indirect Taxes | 5,139 | 5,732 | 6,571 | 6,748 | 7,265 | 7,630 | 9,638 | 10,632 | 11,076 | 11,591 | 12,569 |
| Value added or total factor income by project[1] | | | | | | | | | | | | |
| *Ramo* | *Project* | | | | | | | | | | | |
| R272 | Aluminium industry (Mozal) | 0 | 0 | 0 | 0 | n.a. | n.a. | 3,949 | 5,928 | 7,917 | 7,958 | 8,291 |
| R111 | Industry of gas natural extraction (Sasol)[o] | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 13 | 260 | 465 | 534 |
| R450 | Construction of firms (used as an approximation to mega-project construction)[2] | 0 | 0 | n.a. | n.a. | n.a. | n.a. | 2,978 | 2,792 | 2,894 | 3,326 | 4,003 |
| | Total factor income of Megaprojects[1] | 0 | 0 | n.a. | n.a. | n.a. | n.a. | 6,940 | 8,733 | 11,072 | 11,749 | 12,828 |
| | GDPFC without megaproject, *GDPFC(-)* | 57,042 | 63,342 | n.a. | n.a. | n.a. | n.a. | 87,634 | 91,608 | 97,574 | 106,424 | 114,704 |
| | Megaprojects share in total GDPFC | 0.0% | 0.0% | n.a. | n.a. | n.a. | n.a. | 7.3% | 8.7% | 10.2% | 9.9% | 10.1% |
| | GDPFC growth (in percent)[1] | 7.7 | 11.0 | 11.6 | 8.9 | 1.0 | 12.9 | 7.7 | 6.1 | 8.3 | 8.8 | 7.9 |
| | Average growth between YEAR and 2006 | **8.4%** | 8.1% | 7.7% | 7.5% | 8.6% | 7.8% | 7.8% | 8.3% | 8.3% | 7.9% | 0.0% |
| | GDPFC growth (in percent, without megaprojects)[1] | 7.7 | 11.0 | n.a. | n.a. | n.a. | n.a. | n.a. | 4.5 | 6.5 | 9.1 | 7.8 |
| | Average growth between YEAR and 2006 (without megaprojects, including construction) | **7.2%** | 6.8% | n.a. | n.a. | n.a. | n.a. | 7.0% | 7.8% | 8.4% | 7.8% | 0.0% |
| | Average growth between YEAR and 2006 (without megaprojects, excluding construction) | **7.6%** | 7.2% | 6.7% | 6.4% | n.a. | n.a. | 7.0% | 7.9% | 8.7% | 8.2% | 0.0% |
| | Difference in growth in pct. point - upper bound, including construction[3] | **1.1** | 1.3 | n.a. | n.a. | n.a. | n.a. | 0.8 | 0.5 | -0.1 | 0.1 | 0.0 |
| | Difference in growth in pct. point - lower bound, excluding construction[3] | **0.8** | 0.9 | 1.0 | 1.1 | n.a. | n.a. | 0.8 | 0.4 | -0.4 | -0.2 | 0.0 |
| | Difference in upper bound growth (in percent) | 15.8% | 18.6% | n.a. | n.a. | n.a. | n.a. | 11.5% | 6.9% | -0.9% | 1.8% | - |

[o] Piping of gas *"gasoduto"* is excluded from calculations since, in the data we have it is aggregated with, the larger component, other piping *"oleoduto"*, and because value added from piping gas is very small.
[1] We didn't have access to production or construction figures before 2002 so, all zeros before 2002 are approximations following the logic of the timeline in Appendix A, and assumptions presented in this paper.
[2] Zeros in this case follow very crude assumptions on all firm construction approximating mega-project construction. See note 1.
[3] Differences in this calculation and the numbers of the table are due to rounding of numbers.
Source: Authors calculations from National accounts.

Next look at growth rates for GDPFC with and without mega-projects. In 1996 total GDPFC was 57MT billion at 2003 prices, while 10 years later, in 2006, it had grown almost 125% to 127MT billion. Using the formula from above this gives an annual average growth rate of approximately eight percent (see the first, year 1996, column of Table 1). Subtracting, from total GDPFC, our larger estimate (including all formal sector construction) of mega-projects contribution in 2006; GDPFC had doubled or grown 100% over the ten year period, giving an annual growth rate, without mega-projects of a bit more than seven percent. With construction included, mega-projects added 1.1 percentage points to GDPFC growth from 1996 to 2006. Using the same approach but ignoring construction in 2006, the mega-projects contributed approximately 0.8 percentage points to the growth rate of GDP at factor cost over the period.

Overall, we conclude that the mega-projects contributed not quite one percentage point to annual average GDP growth over the period. Mega-projects have not been the main source of economic growth nor have all other activities been stagnating once you remove mega-projects from the equation. At the same time, mega-projects did contribute a significant share to growth between 1996 and 2006. The share of mega-projects in total growth is approximately 12%.

**Figure 1: Megaproject share in GDPFC and annual growth with and without Megaprojects. From Table 1.**




## 4 Discussion of Indirect Effects and Taxation

In the previous section we calculate the directly observable effect of mega-projects. This can be viewed as a first approximation focusing on the value that mega-projects contribute to the Mozambican economy by the value added they produce themselves. Such descriptions are important because they provide the immediate regional effects of a project. However, as explained in section 2, first approximations contain a good deal less than what we would ideally like to know. Preferably we would like to determine, not only the direct effect, but also indirect effects from the relation with other sectors of the economy, such as use of infrastructure and sub-

contractors, payment of taxes, environmental effects, technology diffusion, etc. Moreover, we may also be interested in the benefits of mega-projects accruing to nationals, that is, effects of mega-projects after repatriation of profits.

In this section we examine further the share of direct effects which benefit people of Mozambique. While the previous analysis of GDPFC looked at direct benefits accruing to Mozambicans and foreigners alike, here we emphasize (without further analysis) the direct effect for ordinary Mozambicans. In macro-accounts definitions; this is the effect of mega-projects on nationals or effect on Gross National Income (GNI).[4] Secondly, we look at the main indirect effect or second-order effects of mega-projects, which have been discussed in the literature.

On the whole, Mozambicans can benefit from mega-projects either directly – through wages (surplus) paid to employees (owners), or indirectly – through taxes paid to the treasury and purchases of intermediates.[5]

Currently, all mega-projects in Mozambique and all planned mega-projects are highly capital intensive rather than labour intensive. That is, they employ relatively few workers compared to capital. Moreover, most capital is foreign owned. The Mozambican state owns four percent of Mozal, and 25 percent of Sasol pipeline (Andersson, 2001 and Sasol, 2007). Also, according to Andersson (2001) and Kuegler (2008), Mozal employed about 2650 workers during construction and employs about 1300 workers in daily production. For Sasol, similar numbers are close to 1000 and 150 and for Moma 1362 and 450 respectively. On average, Mozambican mega-projects have capital at a value of 1US$ million per employee (Andersson, 2001). That is, direct wage payments to Mozambican employees are small compared to capital repayments on foreign debts. Also direct effect from increased supply of jobs is relatively small. All in all, current literature finds relatively small direct benefits accruing to Mozambican nationals. For example, Andersson (2004) estimates the contribution to national income, of all mega-projects planned to be operational in 2010, to be only one fifth of their contribution to GDP. Castel-Branco concurs (2004) estimating national economy contribution of Mozal in 2003 to be just under 20% of value added. World Bank (2007) writes that the impact on local employment likely to be relatively limited after the construction phase.

While linkage effects are likely to be relatively small, previous literature has focused on five other qualitative potential benefits of mega-projects (Castel-Branco, 2004; Andersson, 2001; and Kuegler, 2008). First, well performing mega-projects give an image of a good investment climate, which will attract more foreign investment. Second, due to their size and importance in the economy they are able to influence government regulations, potentially fostering improvements in the investment climate.[6] Third, they demand and initiate better industrial infrastructure, which may benefit smaller investors and other sectors of the economy. For example, the presence of Mozal practically guarantees that the port of Maputo will be adequately dredged. Fourth, they are export oriented and may bring benefits in the form of linking Mozambique to the international economy by facilitating adoption of new technologies and acquisition of new skills. Fifth, mining companies

[4] Illustratively, the difference between GDP and GNI is, the former is related to income in regions while the latter is related to (Mozambican) passports.

[5] Theoretically ordinary Mozambicans could also own part of a mega-project and thus benefit directly through project surplus. However, no ordinary Mozambicans hold large shares in mega-projects, though, the Mozambican state holds stakes in the projects. Any effect through the state is, similar to taxes, indirect.

[6] This is not necessarily or uniformly a good thing. For example, the power of mega-projects to negotiate a better tax deal has clearly undermined the principle of horizontal equity in taxation with potentially negative effects on the perceptions of fairness within the system.

unlock natural wealth, which earns foreign currency. For the case of Mozambique, the strength of these benefits is unclear.

With respect to taxes, mining-projects considered here, have all been granted Industrial Free Zone status, which means that project processing plants are exempt from corporate tax, import and export duties, and value added tax. In some cases, projects are also exempt for paying income taxes. Instead, they pay a one percent turnover tax on total sales. Sasol's contract with the government was negotiated somewhat later than the contract of the mining companies consequently they have been granted less generous tax treatment. See Kuegler (2008) for more detail on tax treatment of mega-projects.

When mega-projects receive preferential tax treatment, other taxpayers have to face more severe taxation in order to finance the same public expenditure. Thus far, the early mega-projects have received preferential tax treatment because among decision makers it was generally argued that they would not have located their business in Mozambique otherwise thus small tax revenue was better than no tax revenue. According to a staff report of the IMF (2008), government authorities will give less preferential treatment to future mega-projects by adhering to the principles of the Extractive Industries Transparency Initiative (EITI).

## 5 Mega-Projects and Exports

National accounts data related to exports at current prices is gathered either from custom data or from ministry reports. In case of incongruence between these data sources, INE policy is to give higher weight to ministry data. In particular, related to exports of natural gas, priority is given to information from the Ministry of Mineral Resources.[7] Exports at constant prices are calculated as deflated current prices by dividing current prices with a price index relative to prices in 2003. Table 2 present mega-project exports for the years 2003 to 2006 using this methodology.

[7] Since natural gas is a relatively new export product, the Ministry of Natural Resources have decides to follow development of this product very closely, whereas customs pay less attention to the diversity of fuel products.

Table 2: Exports by mega-projects (10^6 MT)

| Description | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|
| Total Exports, current prices[1] | 29,137 | 38,341 | 46,213 | 65,474 |
| Total Exports, constant prices[1] | 29,137 | 35,329 | 37,544 | 44,630 |
| Aluminium, current prices[1] | 13,247 | 20,231 | 23,562 | 36,550 |
| Aluminium, constant prices[1] | 13,247 | 17,834 | 18,260 | 18,383 |
| Natural gas, current prices | 0 | 731 | 2,327 | 2,752 |
| Natural gas, constant prices | 0 | 595 | 2,329 | 2,722 |
| Shrimp (Camarão), current prices | 1,701 | 1,649 | 1,637 | 1,815 |
| Shrimp (Camarão), constant prices | 1,701 | 1,606 | 1,579 | 1,751 |
| Electricity, current prices | 189 | 2,154 | 3,257 | 4,717 |
| Electricity, constant prices | 189 | 2,046 | 3,064 | 4,437 |

[1] Due to the cut-off date of the financial year aproximatly one third of 2006 annual aluminium production was recorded as increase in stock. However, conversations with Mozal revealed that this stock was sitting in the habour area ready for export and was not increased for stratetic reasons consequently, we added it to 2006 exports.

Between 2005 and 2006 there was a sharp increase in the current value of aluminium exports. This increase was mainly due to an increase in the world market price of aluminium, which rose from 39.6MT millions per ton in 2005 to 64.5MT millions per ton in 2006. This finding is confirmed in the current prices, which jumped between 2003 and 2004 when Mozal completed its second construction face in August of 2003 but, since then has been relatively constant. Related to natural gas, Sasol started production and, thus, export in 2004. Exports both in relation to current and constant prices have been growing since then. Aluminium is by far the largest export product, in all years and about 12 times larger than the second largest export commodity.

Non-mega project exports also grew during the period. Real exports grew at an annual rate of about 10% with the majority of this growth occurring between 2005 and 2006. Electricity and tourism, measured as hotel services, are for all years among the five largest exporters, whereas cotton, sugar cashew nuts, shrimp, and tobacco compete among the top ten exporters.

Looking at the series starting from 2003 to 2006, we notice that electricity is one of top export products. In 2003 it was the fourth largest exporter but raising to the second largest over the four years. This increase is due to the Cahora Bassa production and export. The explanation is similar to that of mega-projects considered in this paper; almost all Cahora Bassa production is exported to foreign countries for transformation, and then re-enters into Mozambique, giving large numbers for both import and export of electricity.

Products that can truly be considered as export-products for Mozambique, like shrimp for example, usually comes in at a fifth- or sixth-place among major exporters. Consequently, although mega-projects inflate exports, then products which really bring some value added for the country comes in at later positions.

## 6 Conclusion

Focusing on the operational private mega-projects (Mozal, Sasol, and Moma), we estimate the contribution of these projects to growth in GDP at factor cost. In 2006, mega-projects accounted for about ten percent of value added or about half the value added of the agricultural sector. The direct contribution to growth in GDP as factor costs was estimated to be between 0.8 and 1.1 percentage points implying an average non-mega-project GDP growth rate of between 7.3 and 7.6 percent per year for the 1996-2006. The difference between the two estimates stems from assumptions regarding the value added contribution of construction related to mega-projects in 2006. Overall, the conclusion that economic growth has been rapid in Mozambique holds with or without the direct contribution of mega-projects.

Indirect effects of mega-projects are also informally examined via a review of existing literature. The literature generally finds that mega-projects have very modest effects on the living standard of ordinary Mozambicans. Mega-projects are capital intensive, rely heavily on imported intermediates, and export 100% of their production. As a result, they create few jobs. Linkages to the public budget via tax revenue are also muted due to widespread tax exemptions. It is interesting to note that Zambia has recently reviewed its contracts with mining sector firms, initiating a new tax code for all mining companies.

Looking only at exports give an overoptimistic picture of mega-project value added, while mega-projects account for the lions share of exports, then similarly large import- and repatriation of profit figures in the end reduce their real impact on the economy.

## References


Andersson, Per Aake. 2001. “The impact of the mega projects on the Moçambican economy.” GEST Discussion paper, No. 18.

Castel-Branco, Carlos Nuno. 2004 “What is the experience and impact of South African trade and investment on the growth and development of local economies? A view from Mozambique.” In *Stability, Poverty Reduction, and South African Trade and Investment in Southern Africa.* Human Sciences Research Council.. pp. 28-54.

IMF, 2008. *First review under the policy support instrument: Staff report*. IMF Country Report No. 08/15.

Kuegler, Alice. 2008. Uneven Playing Field: The Application of Tax Incentives in Mozambique. Forthcoming in *Taxation in a Low-Income Economy: the Case of Mozambique*. Routledge

Sasol, 2007. Annual Report.

Wells and T. Buehrer, 2000. *Reduzir a burocracia Lições da Mozal para o melhoramento do clima de investimentos em Moçambique*. GEST Discussion paper, No. 3.

World Bank, 2007. *African Development Indicators 2007*. World Bank.

## Appendix A: Timeline[8]

1998: The first construction phase of the US$2 billion Mozal aluminium smelter project starts.

18 June 2000: First metal cast is produced at Mozal in Beluluane Industrial Park.

21 June 2001: The second construction phase of Mozal begins. Purpose of the expansion is to double the capacity of the smelter.

June 2002: Construction of the US$1.2 billion project consisting of a central processing facility to clean and dry the gas in Mozambique and an 865 kilometres pipeline from Temane to South Africa is commenced by Sasol.

August 2003: Mozal Phase 2 is finished

February 2004: Sasol completes development of the Temane natural gas field in Mozambique and, on the 18th the first volumes of natural gas fed into the Temane central processing facility and piped from Mozambique to South Africa.

August 2004: Construction of the US$265 million Moma titanium mine project is commenced.

November 2004: Brazilian Vale (Companhia Vale do Rio Doce, CVRD) wins an international bid to explore coal deposits in the Moatize region, in the north of Mozambique for US$ 122.8 million.

November 2006: The Moatize project's financial and technical feasibility studies is completed and delivered to the government of Mozambique. Since 2004, Vale (CVRD) has invested approximately US$ 80 million in the Moatize project. This amount comprehends US$ 6.47 million invested by the Company in several social programs in the Mozambican cities of Tete and Moatize.

25 April 2007: The first, of six, phases in the construction of the Moma mine is complete and production is started.

28. June 2007: The government of Mozambique approves the mining contract for the exploitation of the Moatize coal project. The projects total investment is estimated to be US$ 1.398 billion, it includes mine development costs, the construction of a maritime terminal for ship loading, related investments and social projects. Expenses for 2008 are budgeted at US$ 97 million and preliminary estimate of start-up of operations is in 2011 (Vale press release 11/10/2007).

7. August 2007: Phase 2 of the construction of the Moma Titanium Minerals Mine is finished.

14. December 2007: Moma starts exporting ilmenite product.

[8] This timeline is based on information from each company's homepage or annual reports.