

*Impacts of the Mozal Aluminium Smelter
on the Mozambican Economy*

(Final Report)

*Submitted to Mozal by
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Introduction

This study, commissioned by Mozal operations team (MOT), responds to the need for an up-to-date, reliable, and unbiased account of Mozal's effects upon the Mozambican economy. The study considers direct (macroeconomic) and indirect impacts from both positive and negative perspectives. To the extent possible, the timeframe for analysis comprises past, present, and future impacts in consideration of both the historical context and issues relating to sustainable development. While not every issue is covered in-depth, the report highlights areas where further research is warranted.

Availability of data and ease of investigation define which issues are looked at in depth, and which ones are recommended for further research as necessary. In this manner, we present a model for analysis. In addition, Mozal is still a young project, and full impact (in all areas) cannot be deduced at this time.

This report is divided into three main sections, Quantifiable Direct and Indirect Impacts, Unquantifiable Indirect Impacts and Conclusions. Generally, the direct impacts are those of a more macroeconomic and quantitative nature. We include impact on GDP, manufacturing gross output and value added, balance of payments, government budget, and direct employment. Following this analysis, the observations regarding indirect, and predominantly qualitative, effects are presented. We cover institutions, downstream industry, local firm empowerment, demonstration effect, indirect employment, human resources, and infrastructure. In the final section, we list the main conclusions of the study, regarding Mozal's impact as well as the capacity of the economy to absorb and take advantage of Mozal's externalities.

1. Quantifiable Direct and Indirect Impacts

Mozal's business is the production and sale of aluminum. Thus, the analysis of Mozal's impact on the Mozambican economy needs to start from the direct impact of production and sale of aluminum. To date, 100% of Mozal's output is exported. Unless downstream industries in Mozambique are developed that provide continuous demand for aluminum at a competitive price, this will continue to be the case.

Additionally, Mozal is a very large importer and has been awarded the right to free profit repatriation under the provisions of the industrial free zone legislation and the Investment Project Authorisation (IPA). The Mozambican economy needs to grow faster and also needs a higher proportion of economic growth to come from net exports in order to sustain long-term investment and growth. Thus, this study shall start from the analysis of growth and balance of payment direct impacts of Mozal.

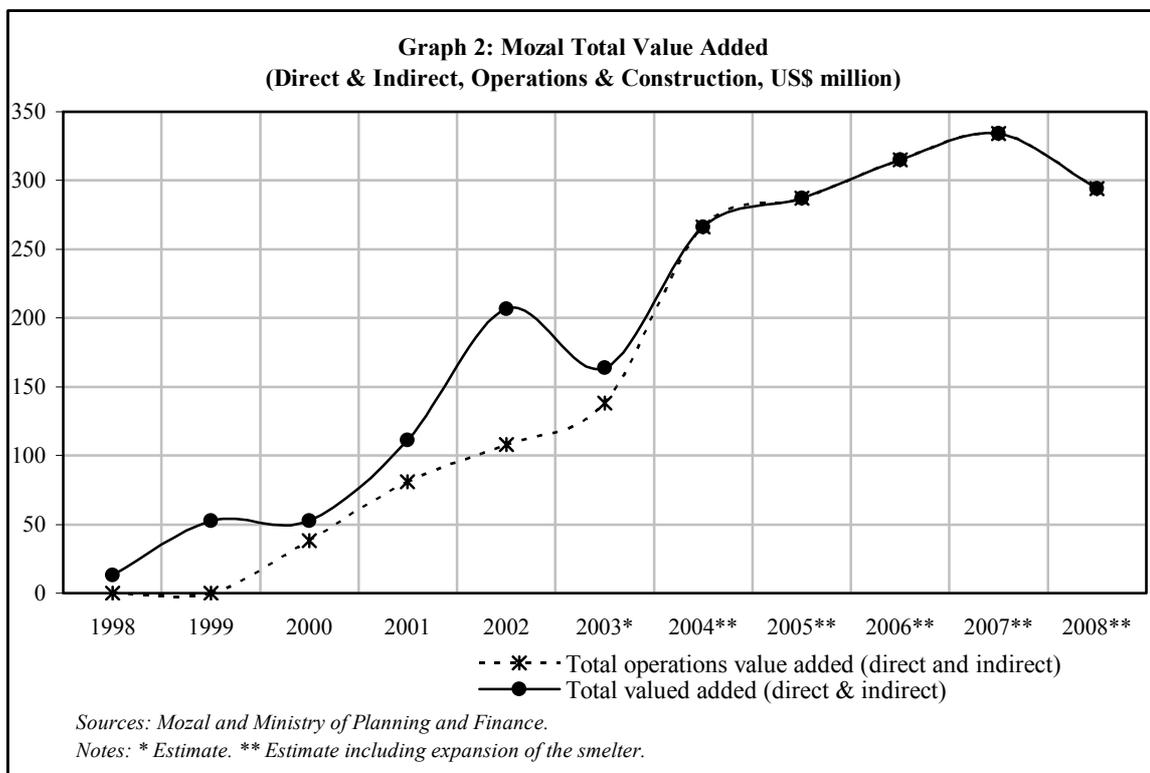
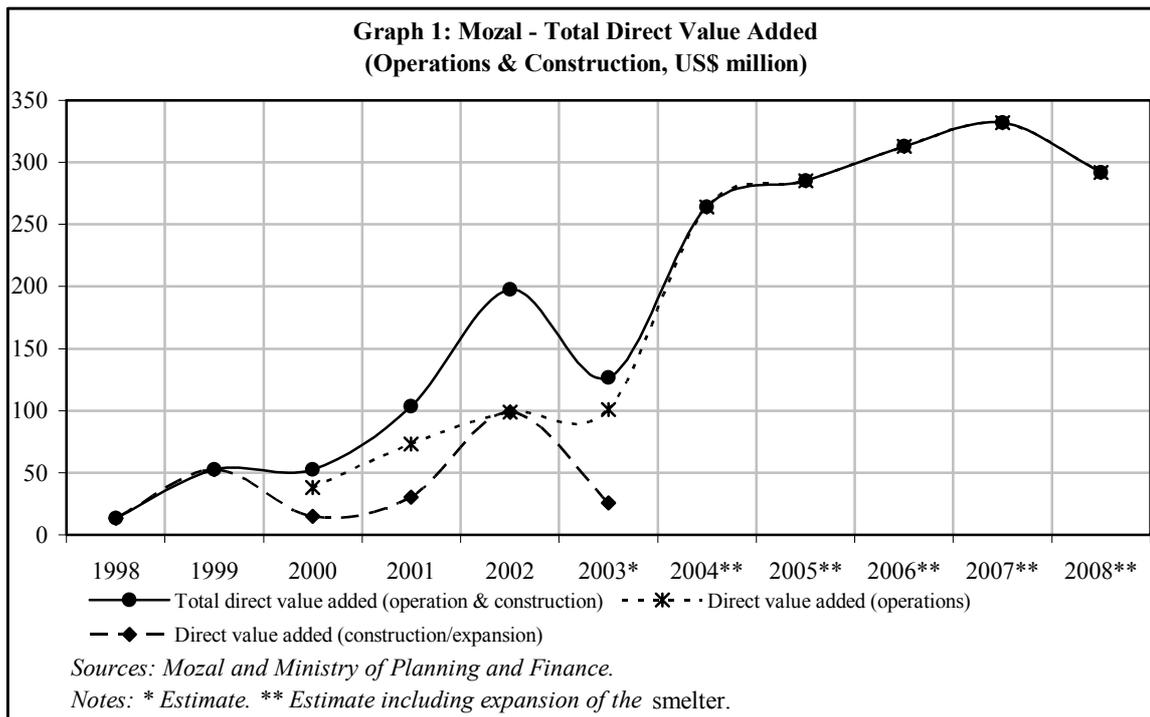
1.1 Economic growth

Graphs 1 through 8 provide information about Mozal's growth potential. Graph 1 is the expected direct value added trend (sales, minus costs, plus salaries and wages) of Mozal through to 2008, disaggregated by construction and operations. The graph shows the impact of construction and coming into operation of Mozal (Mozal 1) and its expansion (Mozal 2). As with any firm capable of operating at full capacity, large or small, Mozal reaches its steady state quickly; at steady state, growth is slow and fluctuates around a stable point, which is only affected by short-term demand and price shocks, and business cycle dynamics.

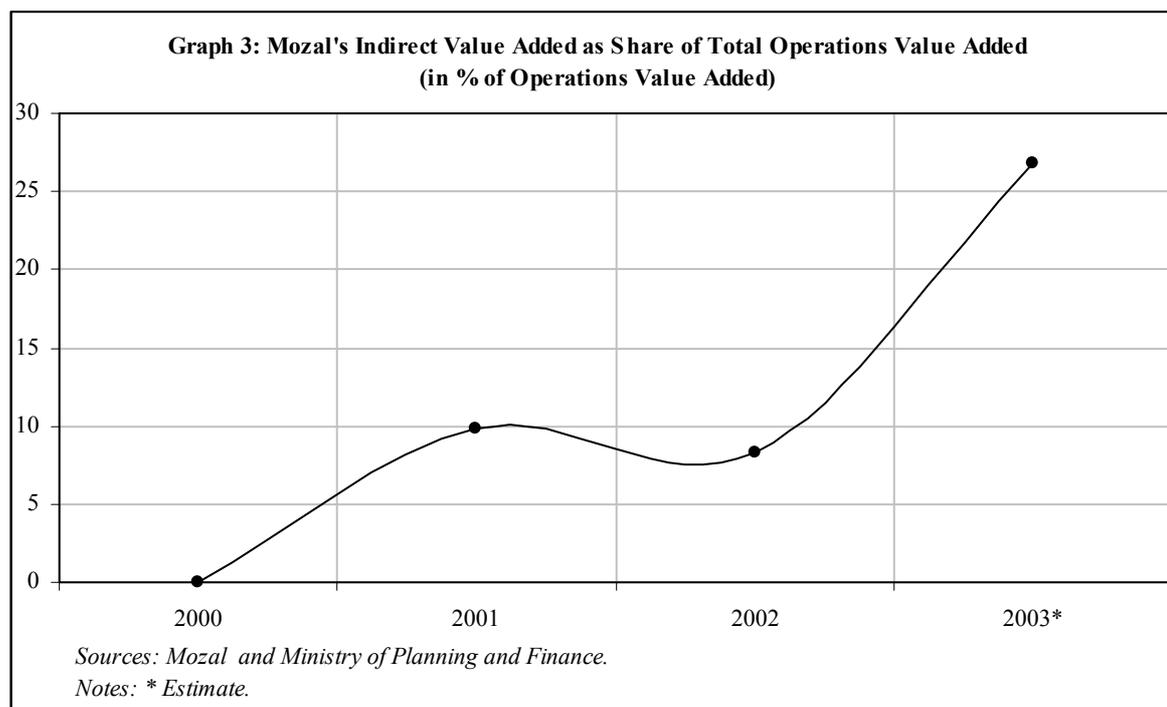
Only new investment in expansion and/or technology change or collapse of the corporation force radical changes in output once steady state has been reached. Thus, main fluctuations in value added, in graph 1, are explained by the current dynamics of the firm, mainly construction and expansion. For example, the end of the expansion project explains the value added fall between 2002 and 2003. Subsequent growth, up to reaching steady state by 2004, is due to the process of fully incorporating the new added capacity into the production process.

The graph also shows that Mozal, after expansion, reaches steady state faster (one year) than Mozal 1 (two years). This shows another characteristic dynamics of a large and new industrial firm: the learning effect that takes place with operation.

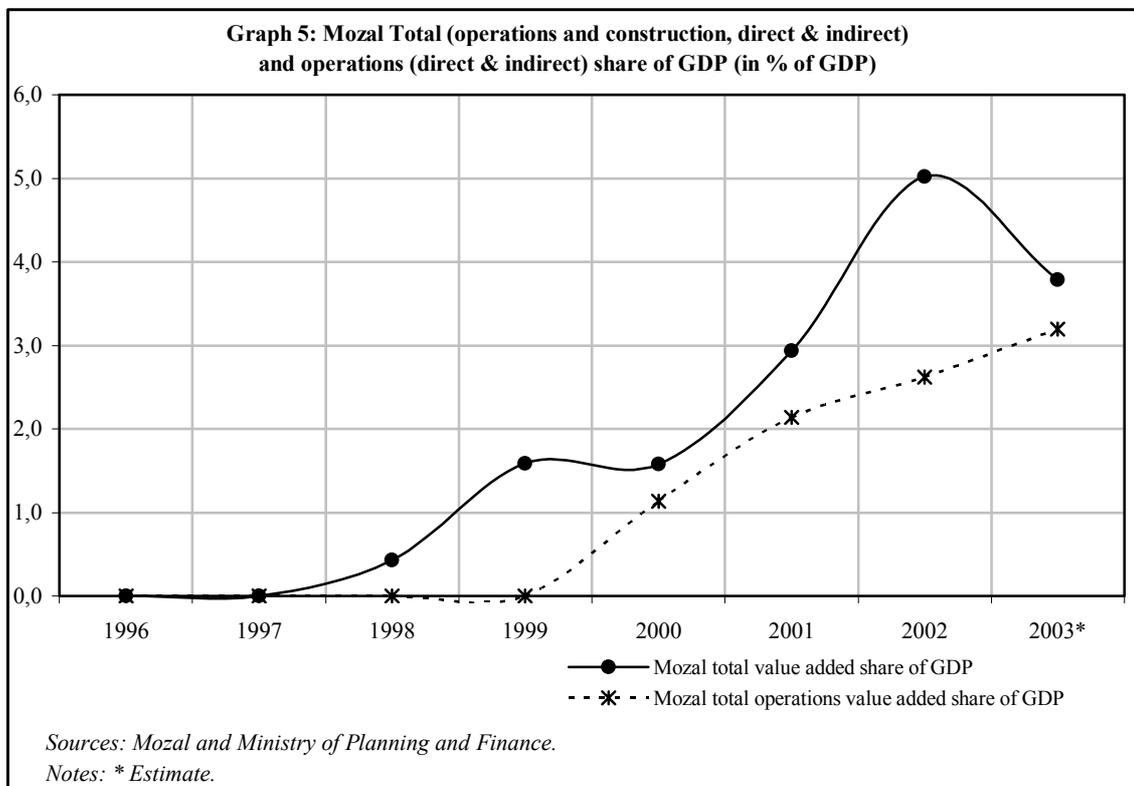
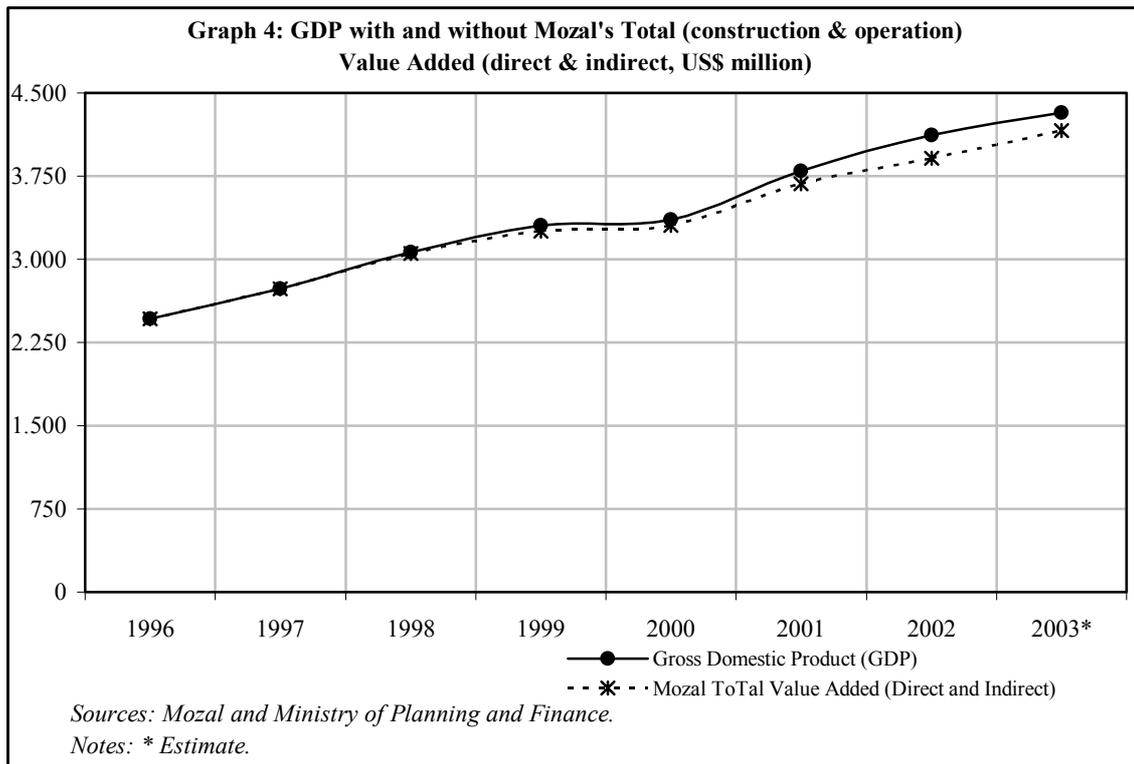
The same characteristics are shown in graph 2, which incorporates, also, indirect value added generated through externalities resulting from domestic purchases and subcontracting.



Graph 3 shows Mozal's indirect value added (operations) as a share of total value added in operations. Indirect value added reaches its current peak in 2003 (approximately 27% of total operations value added), as a result of increasing strengthening relations with domestic firms: purchases and subcontracting from Mozal. As discussed in the second section, the strengthening of the links with domestic suppliers (that lead to Mozal buying US\$ 78 million worth of goods and services from domestic suppliers in 2003) results mainly from the relocation and establishment of subsidiaries and representatives or foreign (mostly South African) firms in Mozambique, or establishment of partnerships and joint ventures between Mozambican and foreign firms. Nonetheless, the bulk (almost 50%) of purchases in Mozambique is still associated with primary facilities: water and energy.



Graphs 4 and 5 show that Mozal has a sizeable direct and indirect impact on GDP: 3.2% from operations only (direct and indirect), and up to 5% when construction is included. Thus, other things being equal, GDP would have been between 3.2% and 5% smaller in the absence of Mozal. These are large figures because we are drawing a comparison between one single plant and the whole of the economy.

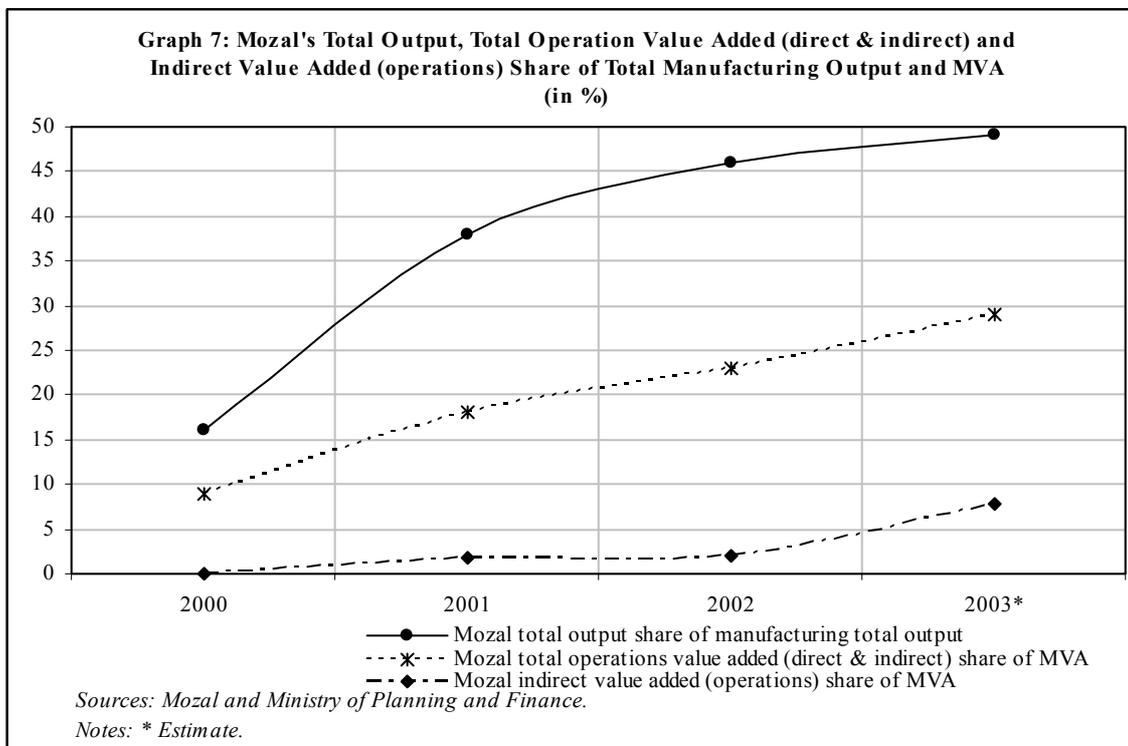
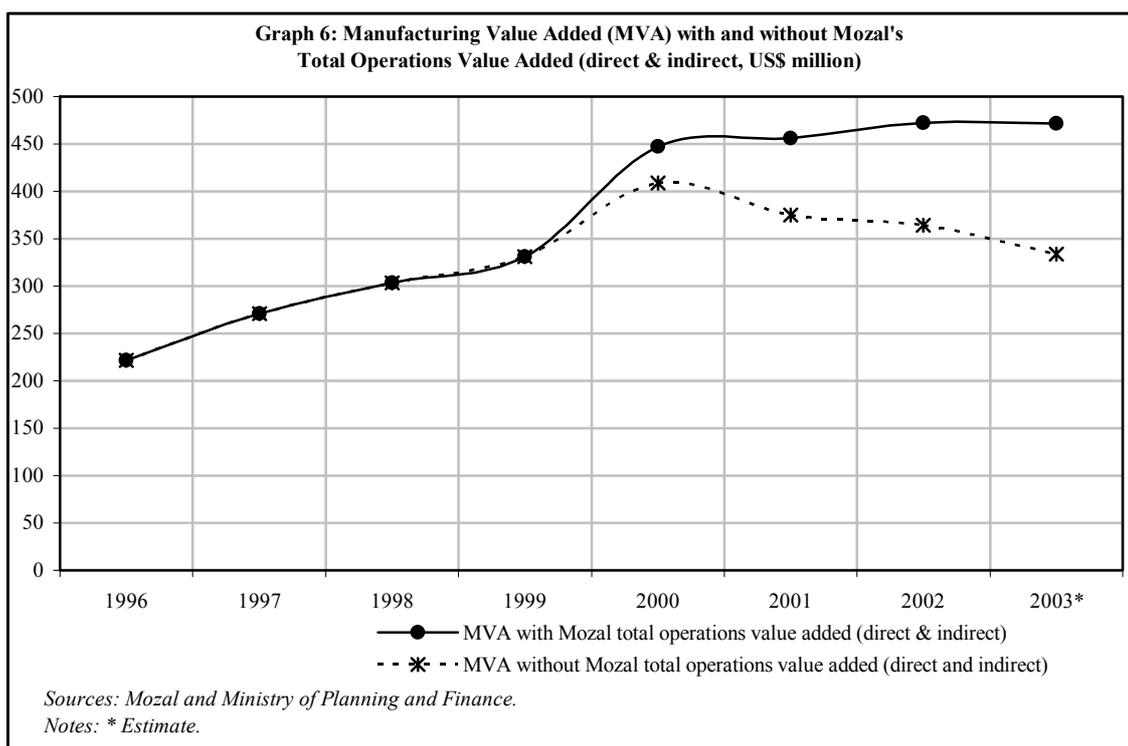


Drawing from graphs 1 and 2, in 2004 there will be another large increase in Mozal-operations share of GDP because of Mozal 2 coming into production. This boom will last for one year only (2004).

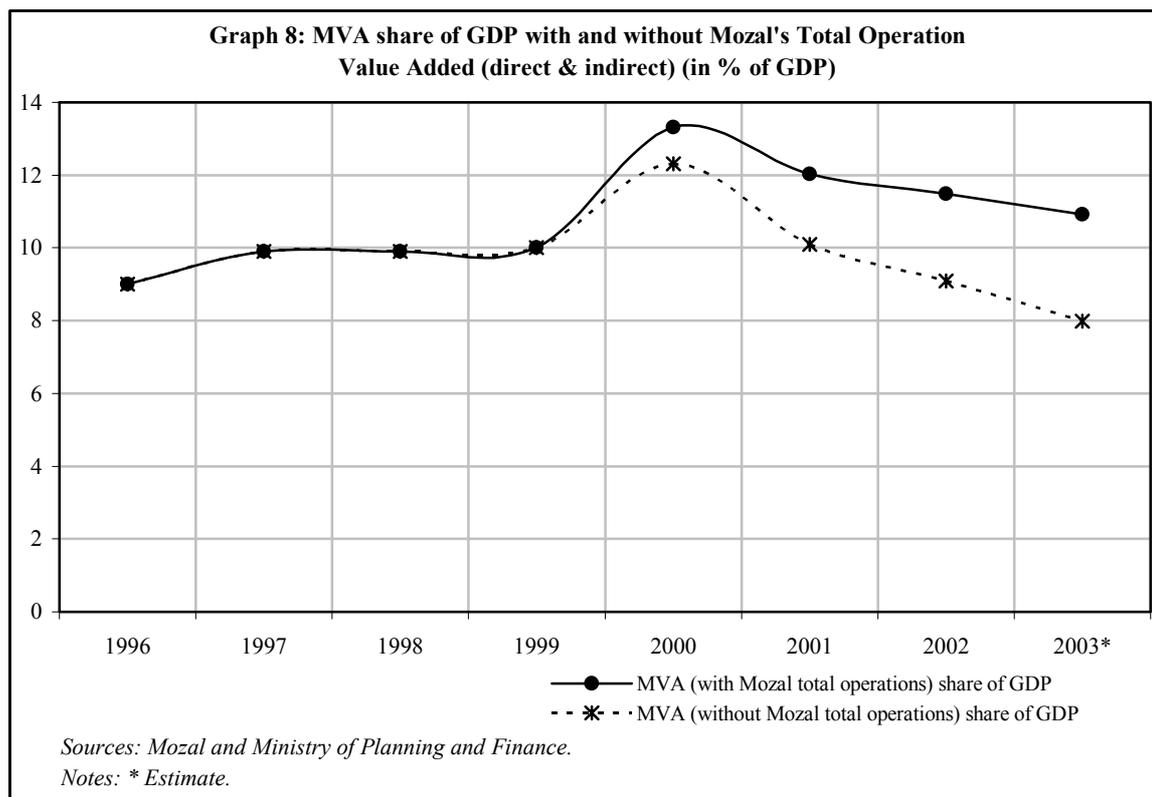
After Mozal reaches steady state, its impact on GDP will start to fall at a rate equivalent to the difference of the rates of growth of the economy and of Mozal. Alternatively, Mozal will be able purchase more domestic goods and services and subcontract more domestic firms, such that the indirect impact of Mozal increases so significantly as to force a sizeable increase in total Mozal value added. If domestic purchases and subcontracting double next year, other things being equal (including the rate of growth of GDP), Mozal's operation share of GDP may increase from 3.2% to 3.8%. Thus, a very significant effort by Mozal, domestic firms and policy makers is required to increase the weight of Mozal on GDP (of course, controlling for new expansion of Mozal, as well as variations due to demand and price shocks and natural business cycles).

Graphs 6 through 8 illustrate the impact of Mozal on manufacturing value added (MVA) and gross industrial output. Although, as expected, Mozal's impact on the manufacturing sector is almost 10 times larger than on the whole of the economy, the general dynamic path is confirmed: after a few years of fast growth, Mozal reaches steady state and its weight stabilizes if manufacturing and/or the rest of the economy do not grow; or slowly melts away if manufacturing and/or the rest of the economy grow. The rate at which Mozal's weight on the manufacturing sector and the economy falls when production reaches steady state depends on the rate of growth of manufacturing and of the economy as a whole relative to the rate of growth of Mozal.

Graph 6 shows that MVA is falling slowly but continuously and consistently. Mozal, on the other hand, prior to the expecting boom due to Mozal 2 coming into operation, has reached steady state. Due to Mozal, MVA is approximately US\$ 160 million higher than it would otherwise be. As shown in graph 7, Mozal represents 49% of total manufacturing output and 29% of total MVA, which makes aluminium by far the most significant industry in Mozambique. Mozal's indirect impact on MVA (which is only 27% of Mozal's total operations value added), is larger than the impact of the textiles, clothing and metal engineer industries put together.



Graph 8 shows that with Mozal, MVA's share of GDP reached its peak in 2000 (13%), but fell afterwards – this was to be expected because Mozal reached its steady state prior to Mozal 2, MVA has been falling, and GDP continues to grow at reasonably high rates. The expansion of the smelter may bring MVA (with Mozal) share of GDP to a level above that reached in 2000, depending on how the other sectors of manufacturing, and the economy as a whole, behave.



It is clear, however, that Mozal's contribution to fast growth of the economy depends on continuing expansion (which is unlikely to happen), and/or on accelerating and expanding the incorporation of more domestically produced goods and services in Mozal's production through domestic purchases and subcontracting. Even the externalities and linkages generated by Mozal have a finite multiplier effect, unless Mozal expands. Thus, Mozal's ability to be a growth engine is short lived.

Graph 7, quite apart from illustrating the short lived direct growth dynamics of Mozal at any level of installed capacity, also shows that Mozal's gross output impact on

manufacturing gross output is almost twice as high as Mozal's value added impact on MVA. This happens because Mozal is a large importer and because the process of production of Mozal, being capital intensive and not based on domestic resources, proportionally adds less value to its output than the average industry in Mozambique. Thus, it is very important for the sustainability of the economy as a whole that Mozal is also a large exporter and is developing more domestic linkages. At the end of the day, Mozal's external trade balance is decisive in the evaluation of Mozal's potential to help sustain economic growth in Mozambique.

In sum, no single firm can be the only, continuous and long-term growth engine of an entire economy. Without growth throughout the economy and in remaining firms (even if this happens as a result of positive linkages generated by a very large firm), and the emergence of new firms, the economy will ultimately cease to grow. For Mozal to help induce growth across the economy, three conditions have to be met. First, Mozal has to generate more of the scarce resources that it utilizes, in particular foreign exchange and savings. Second, Mozal has to develop domestic business capacities and networks of suppliers, if not industrial consumers of aluminium. Third, the economy needs a strategy to significantly develop its absorption capacities. The first two points are discussed below (external economic balances, income and savings, and indirect impact of Mozal). The third, though crucially important, and even more so than the second, is not part of the terms of reference of this study because it goes beyond what Mozal, alone, can do.

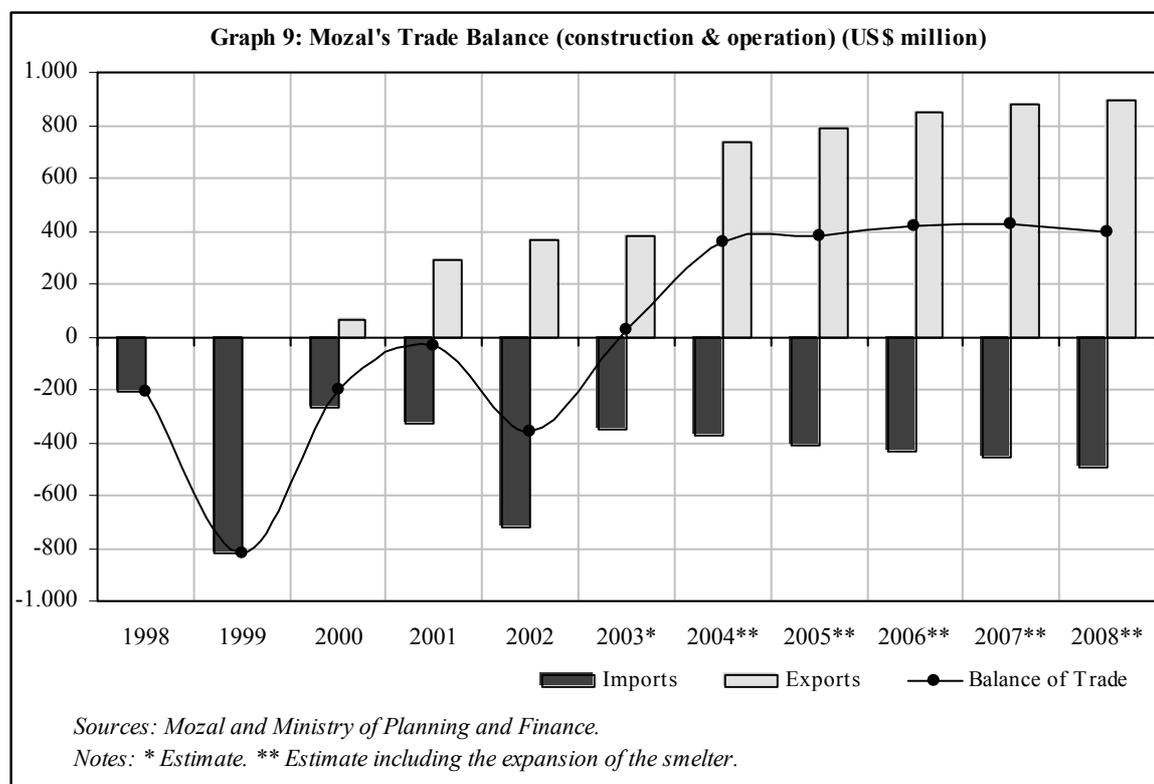
1.2 External Balances and Sustainable Growth

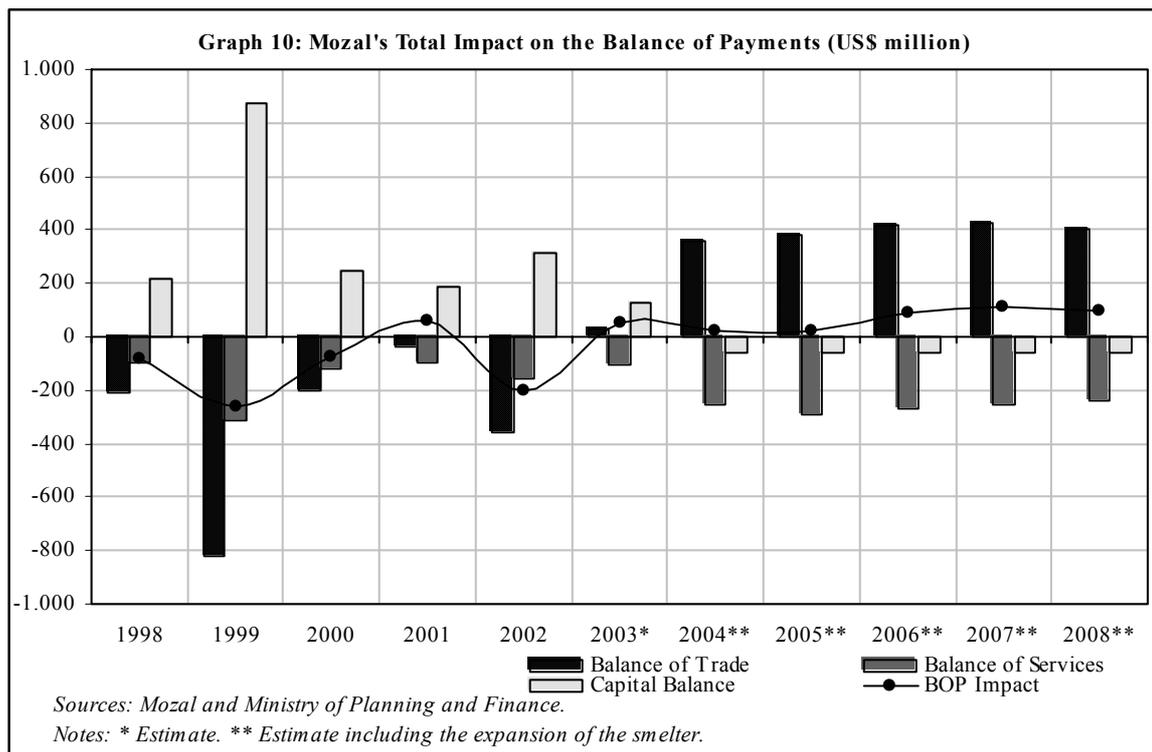
Graphs 9 through 12 illustrate the dynamics of Mozal's impact on the balance of payments. Graph 9 shows actual and expected net trade gains of Mozal, including the effects of construction (net drain of foreign currency) and operation (net generator of foreign currency), confirming this firm as a very large exporter. Provided that aluminium prices and international demand remain relatively stable, Mozal, at steady state, can generate net external trade gains of about US\$400 million per year. In 2003, Mozal's net trade gains alone may reduce Mozambique's trade deficit by about one quarter, other things being equal. This is the most significant impact of Mozal on the

economy, and the largest-ever positive impact on the trade balance of any project in the Mozambican economy.

In order to evaluate more rigorously the net trade impact of Mozal, it would be necessary to calculate the net present value of trade over the life span of the project, which is almost 3 times longer than in the graph below, and that would require more information about the probability of Mozal 3, estimation of demand and prices, and also of the possibility of incorporating more inputs from the Mozambican economy.

Net trade gains can be improved if Mozal incorporates more domestically produced goods and services into its production process, through more domestic purchases and subcontracting. However, it is necessary to bear in mind that alumina and electricity, alone, contribute to two thirds of Mozal's imports for operation. Of the remaining one third, at least half is sophisticated equipment and spares that cannot be produced locally. Thus, through import substitution Mozal can only reduce exports by not more than one sixth. Hence, there is some room for improvement, but not large.

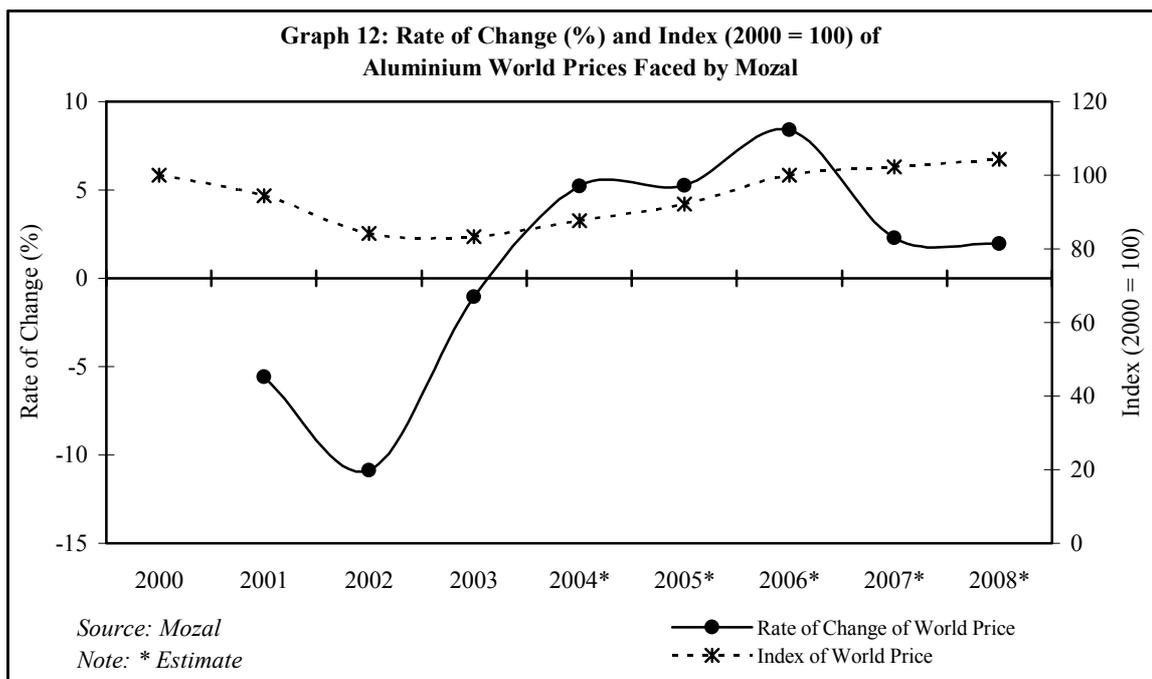
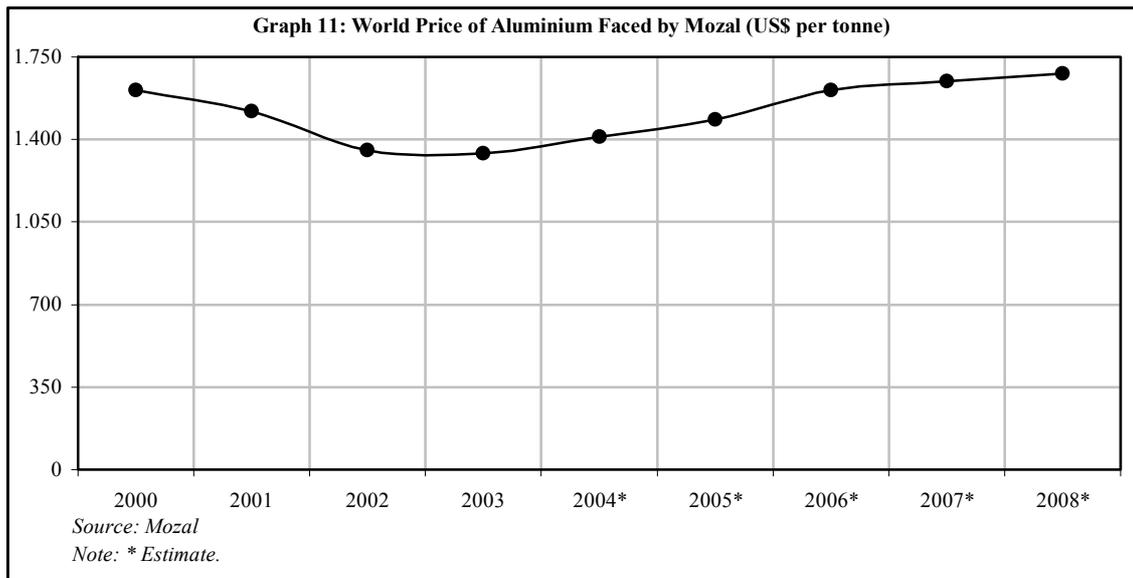




Mozal's overall direct impact on the balance of payments is not limited to trade, because foreign direct investment also has a cost reflected through the balance of services and the capital balance. Graph 10 shows that the overall impact of Mozal on the balance of payments (BOP) is far less impressive than on the balance of trade. The positive contributions to the BOP are inflows of foreign direct investment and the positive trade balance; the negatives are the costs of foreign investment: profit repatriation, debt amortization, and investment and management services.

The negative net trade balance up to 2002 is due to the impact of construction and expansion. Given that Mozal is going to be generating net trade gains worth about US\$ 400 million a year, in steady state, further investment in expansion is unlikely to lead, again, to short term negative trade balance. On the contrary, assuming that world demand and prices do not suffer any significant downturn, expansion is likely to increase Mozal's net trade gains by about 30%. However, one should be cautious about that because the world aluminium prices faced by Mozal have had significant downturns in recent years (graphs 11 and 12). Biliton, the largest, and more vertically integrated aluminium producer in the world, certainly has some influence in the world

market and can decide about transfer and allocation of its own profits. However, one of the ways that can be used by Mozal’s shareholders to influence world prices is by managing production – in other words, when world prices go down because of excess supply, Mozal is unlikely to expand production, if Mozal’s shareholders do not envisage and perceive other future strategic advantages to be taken through market restructuring.



Outside period of large inflows of external capital to the firm (such as for expansion), the capital balance will tend to be negative because of profit repatriation. This trend will be reinforced as Mozal's profits increase. Mozal can reduce this outflow of capital through different ways: (i) reducing disposable profits by paying more taxes, paying higher wages, or spending more in social programs; and/or (ii) re-investing a higher share of the profits in the Mozambican economy.

What happens to the balance of services depends on a series of factors such as, for example, investment management services; and private transfers (which are associated with repatriation of wages and salaries of foreign workers). As the share of local salaries and wages increases, and taxes on foreign salaries and wages are introduced from January 2004, private transfers abroad will tend to fall at least in relative terms.

Aluminium price instability may have two distinct types of impacts on external economic sustainability. One is its direct impact on net trade gains, already discussed. Another is its direct impact on foreign reserves and the value of the currency, both of which have an impact (of different magnitudes) on the balance of payments and ability to finance it. A sudden and significant fall in prices may create a large balance of payment deficit, reduce foreign reserves and force devaluation that would have an inflation impact on production costs, while not necessarily promoting exports from other sectors (exports are not only a function of relative prices, but also of quantities available, time of delivery, quality and standards, reputation, loyalties and market presence, etc.). As profits fall, the capital balance may tend towards equilibrium.

A sudden and significant increase in prices may result in the opposite process, including appreciation of the currency that may encourage imports as opposed to promoting domestic production, and larger profit repatriation. Due to profit repatriation, large increases in prices may not result in currency appreciation if it does not result in an increase of foreign currency supply and encourages imports.

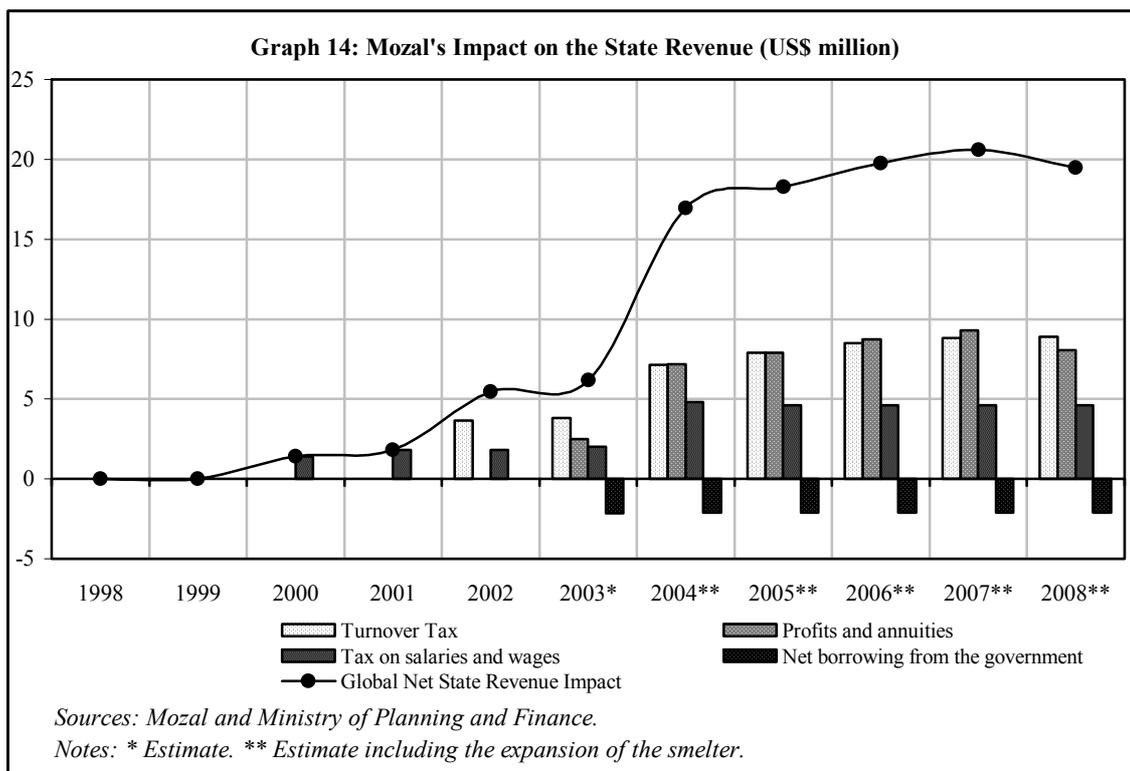
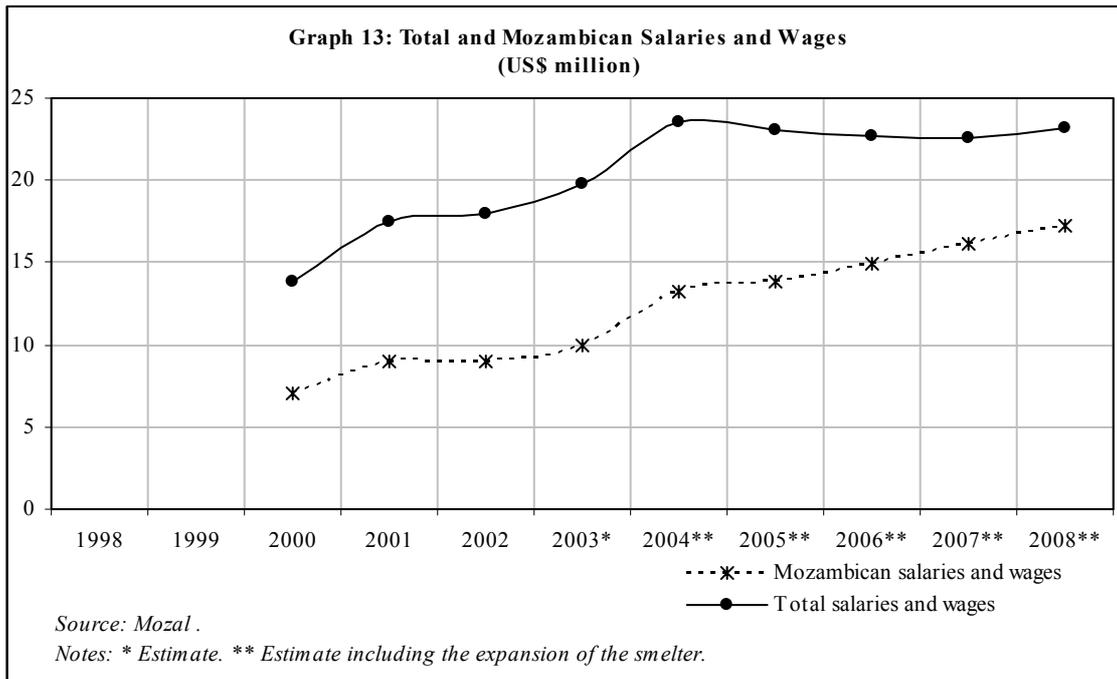
Nonetheless, given the massive impact of Mozal, it would be wise to develop a model of balance of payment management in the presence of sudden and large price variations in the world aluminium market.

For a more precise and rigorous analysis of Mozal's impact on the overall balance of payments, it would be necessary to get more precise estimates of the different components of the different balances, and when the different flows happen, and then estimate the net present value of such flows over the life span of the project.

1.3 Income and Savings

Other two fundamental contributions of Mozal to income and economic growth are employment and public revenue generation. These are, probably, the weakest contributions of Mozal. Direct employment opportunities, on a long-term basis, are not proportional to the scale of the project because of the capital and knowledge intensity of the plant's process of production. Nonetheless, Mozal employs more than one thousand Mozambican workers, generally much more skilled than the average Mozambican industrial worker. Mozal also follows strict health and safety regulations for their workers and workers of suppliers that operate in the plant. Wages and incentive schemes are also better in Mozal than in the vast majority of other firms in Mozambique. Total wages and salaries of Mozal's Mozambican workers in 2003 are expected to reach US\$ 10 million, and increase to about US\$ 17 million by the 2008 (graph 13). Thus, although Mozal has not created many direct jobs relative to the scale of investment, it has certainly created better jobs.

Due to the provisions of the industrial free zone status and of IPA, Mozal benefits from significant tax incentives. As a result, Mozal's contribution to public revenue (graph 14), at steady state, is only about 0.5% of total public revenue. This compares unfavorably with Mozal's share of GDP (3.2% at steady state prior to Mozal 2), that may increase to up to 4.5% with Mozal 2.



The fact that Mozal's public revenue contribution is small also reduces the actual, uncommitted contribution of Mozal to availability of foreign currency. This is because net foreign exchange generated by Mozal (or any other private firm) belongs to Mozal (or any other private firm), not to the economy as a whole. Foreign exchange gains of any firm are absorbed by the economy via different mechanisms: taxes, re-investment, purchases from local suppliers, local wages and royalty payments.

Taxes and royalty payments to the state, as well as wages are the only forms of uncommitted absorption of foreign exchange because the state and wage workers can use their revenue/income irrespectively of the source of revenue. Purchases from local suppliers generate dynamic effects through the economy, although still closely tied to the dynamics of the anchor project. Re-investment, even if diversified away from the mainstream business, maintains control of financial gains with the original firm. Re-investment has a short term impact, if the subsequent increase in capacity is not reflected in significant increases with respect to wages, buying from local suppliers and taxes.

Mozal's main contributions to spreading foreign exchange gains through the economy are re-investment, due to the expansion project; and purchases from local firms. Over the last year of activity (June 2002 to June 2003), the value of Mozal's purchases from domestic firms has exceeded total sum of taxes and local wages by more than 50%. While there has been a significant improvement in local linkages, these are still weak and centered on activities that are too tied to the project.

Mozal can improve the situation, and also its contribution in other areas like the overall balance of payments, by increasing purchases from domestic firms, tax payments on foreign wages to be introduced from January 2004, substitution of foreign by local workers, higher tax payments on turnover, profits and annuities.

Although a marginal increase in tax revenue from Mozal would not change, significantly, the weight of Mozal on GDP and MVA, it could be more significant to the economy than the social program that is currently implemented with local communities.

2. Unquantifiable Indirect Impacts

2.1 *Defining indirect effects*

Indirect impacts of investment are often unquantifiable and immeasurable. This is especially true with regard to institutional and demonstration effects; and the impacts of Mozal are no different in this regard. In some situations impact is difficult to measure because it is simply too soon to tell the lasting effects. In other areas, net impact may not be discernable because they have both positive and negative externalities, which cancel each other out. Although we must consider these unquantifiable contributions and include them in our impact analysis model, we are cautious in drawing conclusions about indirect and multiplier effects.

We should distinguish between what is the *potential* for linkages, and what are the linkages that *effectively* take effect. A large firm, as Mozal, may create the potential for linkages, but these can only take effect if other firms invest in learning, upgrading, seeking contracts, developing networks, and so on. Thus, linkages are not costless externalities. In practice, we should be cautious when attributing linkage effects to Mozal, because there is a difference between Mozal providing the opportunity and other firms making the necessary investment to benefit from such opportunities.

Additionally, there are externalities that result from falling marginal costs to other firms and industries as a result of some investment made by Mozal or because of Mozal. This is, for example, the case of industrial waste removal and training of uncommitted workers. In many other cases, however, linkages are simple input-output relationships. In these cases, it is necessary to go behind the input-output relationship to assess the improvements that are happening as a result of such a business relationship, and how such improvements can benefit other firms.

In brief, we should be looking for externalities that reduce marginal costs to other firms, create more capacity in the economy, and promote full employment of existing capacity. A proper, quantitative analysis of such externalities is very difficult, and requires case study methods of product chain analysis.

2.2 *Institutions*

The nature and location of the project mean that numerous institutions are affected across national, provincial, and municipal levels; along with para-statal. These include but are not limited to: Ministry of Industry and Trade, Ministry of Labour, Ministry of Planning and Finance, Ministry of Public Works and Housing, Ministry for Coordination of Environmental Action, Ministry of Education, Center for Promotion of Investment, Police, Boane District Administration, Matola Municipal Administration, Government of Maputo Province, Electricidade de Mozambique (EDM), Telecomunicações de Mozambique (TDM), the Customs Authority, and other firms or entities with which Mozal interacts.

In general, both positive and negative effects have been identified.

- Positive: Capacity building and best practices for institutional interface. Mozal created challenges that required individual and collective action. Questions needed to be answered and matters addressed with a new sense of urgency. Furthermore, the critical importance of coordination within organizations and among them was seen and addressed. Moreover, the institutional-interface model established for handling Mozal, comprising the Government Task Force, IPA Steering Committee and several issue specific Task Groups, has been applied to other large investments (for example Sasol), confirming its success. Mozal managers across departments – from Construction to Operations – reported significant improvement in the responsiveness of their respective government and official counterparts.

One lingering weakness and obstacle is the personalization and centralization of authority in each organization. Decision-making is not organized along lines of decentralized competences and initiative according to the nature and complexity of the problem, strategic and day-to day decisions, tactical decisions. In many organizations, all decisions that go beyond pure routine have to be taken by the top level, which prevents institutional and collective initiative, responsibilities and

capacities to be developed, reduces significantly the efficacy and efficiency of the organization, and delays operations.

- Negative. Crowding out. This reflects the concern that the attention to Mozal rendered other issues to the ‘back burner’. Responsiveness developed for Mozal is not necessarily institutionalized in general ‘work ethic’ or sustainable from the point of view of existing institutional capacities. For example, it would be impossible to replicate the Mozal like interface to deal with all investment projects of some significance. This is, of course, quite apart from the fact that unless investors are large enough and organized at industry level (Mozal and Sasol are industries on their own right), collective action to persuade the state to pursue a Mozal like approach to them would basically fail. As argued by one interviewee, it is easier to put a billion dollars in Mozambique than a million.

2.3 *Downstream linkages*

Aluminium production has the potential to yield forward linkage effects in downstream products in many of the same ways as production of the primary material, including employment, exports, imports, tax revenues, network of suppliers and GDP growth. Additionally, downstream industries could also diversify production, industrial capacities and skill patterns in the economy, in addition to opening the doors to new markets and new business opportunities.

At this time, however, one cannot even forecast the dynamics of potential downstream production in Mozambique because there are not, as far as we know, concrete data and projects to look at. Interest in setting up plants for secondary products has been shown by few parties, but as of yet no concrete projects have been proposed and a few fundamental technical issues have yet to be solved – for example, related to pre-processing of aluminium, the scale of activity and the investment required. Furthermore, as the industry moves into higher stages of processing involving the entire product chain, more complex networks and clusters of firms have to develop alongside the formation of a larger pool of skilled workers and managers, with significant improvement in the capacity and quality of business oriented institutions. Moreover, and most important, Mozal’s shareholders would have to decide whether

they are interested in taking the risk of diverting aluminium from established foreign markets to downstream industries in Mozambique.

Thus, the development of downstream industries is a very large challenge for the Mozambican economy, but that could become a powerful growth and development engine. If downstream industries develop, Mozal's indirect impact would be significantly increased and some of the current risks, such as, for example, export concentration in one product and price instability for the primary product, would be greatly reduced.

Downstream SME Opportunity

Currently, approximately 200 tons of dross (for the value of US\$34,000 subject to dross quality) per month of scrap aluminium produced on-site is being collected and sold to an entrepreneur in South Africa, who maintains a small scale factory where the scrap is melted and manufactured into low-cost pots, pans, and other domestic products. A similar set-up could be replicated for a Mozambican entrepreneur – with potentially cheaper costs due to lower transport costs.

2.4 Demonstration effect and synergies for other large FDI projects

The demonstration effects of Mozal have been a subject of much debate. The idea of demonstration effect refers to the “what is possible.” Has Mozal's success, as a firm, put Mozambique on the investment map and therefore induced multiplier foreign direct investment (FDI) effects? Does it confirm that the labour force is available and/or trainable; that government is responsive to large investors' needs; that requisite infrastructure is in place or can be built; that some supporting institutions are functioning or can be made to function for large investors; and that related goods and services inputs are or can be made available? It would be inappropriate to claim that all other FDI since Mozal (for example SASOL, Corridor Sands) is attributable to the “demonstration effect” of Mozal. However, managers of other large projects have

mentioned that the experience of Mozal has made them more confident in the possibilities of some types of very large investment to succeed in Mozambique.

Additionally, Mozal has contributed to creating an institutional culture related to large projects, including a model of institutional interface, which lowers marginal costs of coordination to other projects.

Mozal, being the first mover or pioneer, had disadvantages and advantages relative to subsequent large projects. The disadvantages are related to first mover costs of investing in an economy that is starved of institutional and technical capacities and skills, where domestic linkages and business networks are weak, that is not knowledgeable of corporate culture and corporate ways of doing things, and is suspicious of the ability of large projects to succeed and help the Mozambican economy. The advantages are related to the fact that Mozal was the only large project in place and could, as a result, mobilize relatively more capacity and attention from national institutions than the subsequent large projects will be able to do, even if improvements in institutional capacities that resulted from the experience with Mozal are taken into consideration.

2.5 *Linkages with Mozambican firms*²

Supply chains – of goods and services – are necessary for large projects to succeed. During construction of Mozal 1, limited numbers of local firms were contracted. Besides the information gap regarding available suppliers, those Mozambican firms that did bid on projects were generally unsuccessful because their inexperience with international tendering and pricing rendered their proposals uncompetitive. Furthermore, the majority of the contracts were so large, and the financial and quality requirements so big that most Mozambican firms simply could not do the work to standard. Moreover, Mozal did not have the experience of dealing with a weak network of potential suppliers, and its bundled packages offered for tender were

² The definition of Mozambican firms that is used by Mozal is, roughly, a firm that is duly established and registered in Mozambique, irrespective of ownership, as long as it is not simply a formal subsidiary or representation of a foreign firm.

beyond the capacities of Mozambican firms. Finally, the Mozambican government and private firms were not prepared for the challenges they would face with Mozal such that, as a result, they could not maximize the benefits accruing from potential externalities.

In 1998 and 1999, the Center for Investment Promotion (CPI) carried out an evaluation of about 370 Mozambican firms to identify those that could be upgraded to Mozal's standards, thus improving their chances of winning contracts with the smelter. CPI reports show that of this universe of firms, 99% had serious problems with product quality; 95% did not have the required profile, experience and portfolio of projects; 92% operated with old, worn-out and outdated equipment and technology; 90% suffered from serious management deficiencies and inadequate financial structure and capabilities; and 85% had serious deficiencies with respect to marketing capabilities and business attitude.³

To address the situation, CPI developed a linkage program, which also includes the construction of a linkage data base involving 900 plus firms with potential to supply goods and services to Mozal. This program has started to diversify away from Mozal to include other development poles like the sugar industry. The linkage program also facilitates contacts between interested Mozambican firms and foreign companies that may have complementary capacities and business interests. Many Mozambican suppliers of Mozal, including large firms like Cometal-Mometal and Metech, work in partnership with foreign companies for the specific contract with Mozal.

Select contract packages were unbundled and a shortlist of only Mozambican SMEs was invited to bid.

In planning for the procurement of goods and services for the expansion, a special Small and Medium Enterprise Empowerment and linkage Program (SMEELP) was created, in coordination with CPI, the private enterprise development program (PODE), the World Bank and the Africa Project Development Facility (APDF). Training was offered to the bidders on tender preparation, and those awarded

³ CPI/Linkage Division. 1999. Report on six months pilot programme; and 1998. Proposal to develop a linkage program in Mozambique.

contracts received contract management and performance training. A total of 33 SME firms participated in at least one training course offered under SMEELP, and 19 firms were awarded at least one contract.

SMEELP has been considered useful and helpful by almost 88% of the participating firms, and only 12% claimed that the program did not help them. Of the firms that found SMEELP helpful, 10% said that it was the chance of being with other firms and learning about investment opportunities that make it helpful, rather than the programs taught. The way firms evaluate the performance of SMEELP has to be put into context: it depends also on the stage of development firms are into, and on the issues firm are seeking to address to become more competitive. For example, whereas nobody doubts that many firms need to learn tender preparation and project management; firms that have some experience of international tendering will be less interested in this part of the training that forms the bulk of SMEELP. On the other hand, firms that are mostly trying to learn and pursue technological innovation and upgrading will not find in SMEELP many hints to reach their goal.

Thus, SMEELP addresses some important issues that Mozambican firms have to address, and that are also important for Mozal because of reducing transaction costs in dealing with such firms.

Although significant progress has been achieved in promoting linkages with Mozambican firms, it would be naïve to believe that the core, deep rooted problems that affect the development of Mozambican firms and industries would be easily solved by the set of actions described. The linkage program, SMEELP and the financial model are experiences deserving of closer examination and, probably, of creative adoption as part of the mainstream business models, but they are neither panaceas, nor substitutes for a much more specific, articulated and powerful industrial strategies, that are the business of government in articulation with industries, unions, firms and other interested parties.

In order to significantly increase the Mozambican content of suppliers, Mozal has also adopted a policy that requires that, for some packages tendered, firms are only allowed to bid if they are established and registered in Mozambique. Most of the

packages are for services that can be delivered by small, flexible firms and require little initial capital investment. The combination of this policy and the technical and economic characteristics of the selected packages tendered encouraged South African firms, and/or individual South African investors, to establish subsidiaries and/or invest in facilities in Mozambique. In cases where the service to be provided requires a strong industrial infrastructure, foreign firms either go for partnerships with Mozambican firms already established (as in the case of Kempe/Metech that provides pot line maintenance), or start a new business altogether if there is no Mozambican counterpart already established (as in the case of Interwaste, in charge of industrial waste removal).

As a result of these different promotion strategies, the Mozambican content of direct contracts with Mozal increased substantially. It is estimated that about 20% (or roughly US\$200 million) of the investment in the expansion of the smelter, over a three year period, was spent on “Mozambican” firms. Additionally, between June 2002 and June 2003, operation contracts allocated to Mozambican firms totaled US\$ 78 million, half of which was water and electricity. On average, about two thirds of such expenditure goes into imports of raw materials and intermediate goods, spares, equipment, energy and fuels utilized by the firms to produce. Thus, the total added value to the economy over this period of time, due to direct procurement of goods and services, may be an amount between US\$ 90 million, roughly 33% of the direct value added of aluminium production, alone, in the same period.

Additionally, Mozal has started to think about implementing a model that facilitates access to finance to firms that are awarded contracts. The model consists on a triangular relationship between Mozal, the bank and the firm concerned. After the contract is awarded, the firm applies for a loan (for working capital or investment), and a contract is set between the three parties such that Mozal guarantees the payment of the loan to the bank, the amount of loan amortization is deducted from Mozal’s payments to the firms for the services provided, and the firm gets its credit. Given that both uncertainty and risks are reduced, credit can be made more readily available, directed at specific objectives and cheaper, thus helping all parties to increase returns on their business. This experiment has been tried with Banco Austral/ABSA, because ABSA already has a positive experience with a similar model established in South

Africa. Other banks in Mozambique have been reluctant to experiment with the model.

Currently, there are about 130 Mozambican firms sub-contracted by Mozal for operation. Of these firms, 19 went through the SMEELP program, and approximately 75% are informal subsidiaries or representatives of foreign firms, or foreign firms and investors that established themselves in Mozambique with the aim of reaching the Mozal market.

A total of 22 Mozambican suppliers of goods and services to Mozal project and operations (see list in Appendix 1) were interviewed in order to obtain a more in-depth account of linkages. Many of the firms started directly as a result of Mozal, and in some cases (for example, Interwaste and Bearing Man) introduced an entirely new service or product to the Mozambican economy.

Four firms in basic services (catering, cleaning and manned security) reported employee growth, in some cases by significant numbers. At the same time, some firms felt that Mozal actually limited their immediate growth because of the intensity of management and attention required. With regard to technology transfer, while some firms reported certain efficiency gains through their Mozal contracts and subcontracts, on the whole the contribution here was reportedly limited, mainly because of short-term contracts and opportunistic nature of partnerships with foreign firms trying to gain access to Mozal's market. Nonetheless, the majority of firms reflects positively on the impact of contracts with Mozal. The most important positive impact, mentioned by 75% of the firms, is related to acquire experience of working at high level of demand and pressure, strict quality and delivery timing standards, experience with a more dynamic and demanding corporate culture, and management training.

Data, below, show areas in which contracts with interviewed firms are concentrated:

Engineering/manufacturing industry firms: Cometal-Mometal (pots, chimneys and pipes); Tubex (tools and spares); Kempe/Metech (maintenance of pot lines); Forjadora (containers); Kanes (spares, metal structures and maintenance); Agro-Alfa (repair of start up equipment); MC Engineering (repair of start up equipment).

Construction firms: Marcleusa (electricity substation in the plant and acoustic barrier in the port of Matola); Construções Chemane (maintenance, water drains, removal of temporary buildings); SORADIO (electric installations and wiring, and repairs); and Wade Adams (housing construction and maintenance of buildings).

Industrial services: TDM (phone and phone data base network); EDM (shareholder and represented in Motraco); Strang Rennies Mozambique Consortium, SRMC (export of aluminium); Diesel Eléctrica (suppliers and maintenance of hydraulic equipment); Interwaste (industrial waste removal); and Transaustral (employee transport).

Other services: Eurest Support Services (catering); Gray Security (manned security, reception, and armed response); Thsala Mozambique (cleaning); Cinderella (laundry and uniform management); and Flor Real (landscaping earthworks).

Below, is a list of the impacts of interaction with Mozal that interviewed firms have identified. These are divided between positive and negative impacts, and the impacts are ranked, in decreasing order, by the frequency with which they are mentioned.

Positive impact on the firm interacting with Mozal

1. Acquired experience of working at high level of demand and pressure, strict quality and delivery timing standards, experience with a more dynamic and demanding corporate culture, and management training (17 firms out of 22).
2. Financial impact due to the size of the order and quick payment of the services and goods provided (11 firms).
3. Acquisition of new institutional capacities or improvement of existing capacities, to coordinate activities with large projects within the firm, and to deal with pressure to deliver high quality services and goods in a timely manner (11 firms).
4. Improvement in working conditions, particularly with respect to strict health and safety standards and incentive schemes (9 firms).
5. Reputation in the market (6 firms).

6. Capacity to improve services to other customers (5 firms).
7. Improved capacity to prepare proposals to bid for contracts (5 firms).
8. Product diversification (4 firms).
9. Development of partnerships with foreign firms with higher standards and capacities (4 firms).
10. Upgrading of technology and equipment (3 firms).
11. Learning to subcontract other firms (2 firms).

Negative impact on the firm interacting with Mozal

1. Contracts with Mozal are short term and/or occasional, such that there is no consolidation and development of capacities acquired, nor conditions for continuous investment and upgrading (9 out of 22 firms).
2. Only the workers that have been allocated to work in the plant (in Mozal) benefit from very significantly improved working conditions – strict health and safety standards, better wages, good incentive schemes – but the firm cannot afford and does not need to apply the same conditions for the other markets covered by the activity of the firm. Potential for labor conflicts within the firm (8 firms).
3. Focus on Mozal during the term of contract leads to losing traditional markets altogether, or losing some space and ability to work with the traditional market. Firm may have to restructure and may not have the ability to doing so quickly enough (8 firms).
4. After the contract with Mozal is finished, the firm gets little business from the traditional market such that capacities developed during contract with Mozal are quickly lost or significantly underutilized (6 firms).
5. After the end of a medium term contract with Mozal, the most skilled workers of the firm (recruited or trained to work on the contract) are released because the traditional market of the firm does not require such skills and the firm cannot afford to pay the corresponding wages and salaries (6 firms).
6. Partnerships with foreign firms are short lived and superficial because contracts are short term; or foreign firms, when established in Mozambique,

do not need the partnership anymore. Technology and knowledge transfers are very limited (4 firms).

7. Skilled workers leave to work for Mozal or other mega projects (2 firms).

There are important synergies and multiplier effects coming out of such a large project as Mozal. These impacts are limited in scope when compared to more sophisticated and complex industries, but are very large in scale.

However, the absorption capacity of the economy is so limited that: (a) impact on most firms is too short lived for the firms to be able and interested in investing what is necessary to upgrade and modernize; (b) outside Mozal, there is no need for continuous improvement and upgrading, and no capacity to sustain continuous and large demand of high quality – thus, most firms do not build on the positive experience and new capacities acquired during contract with Mozal; (c) some of these capacities are lost after the end of the contract. For example, trained/skilled workers that become unemployed after the end of the contract, may lose acquired skills if they cannot get a job quickly enough to continue capacity development.

Thus, firms have a reason to be concerned about the short-term nature of most contracts with Mozal, and the impact of such risk on low level of business sustainability, investment and upgrading. However, this is not a problem that Mozal can solve, because they can only contract firms for the work they need. The problem is that Mozal is the only very significant, dynamic and large source of industrial synergies in the Mozambican economy at the moment. This happens not because there are no other possibilities, but because the other (limited) possibilities are not in use, or are not yet strategically organized to be developed as large dynamic poles of industrial synergies and linkages.

As a result, firms are forced to operate on two contrasting levels: one the one hand, there is the demanding and dynamic market provided for Mozal, that is generally short-term in nature; on the other hand, there is the usually fragmented, low quality and restricted market firms have to live with most of the time, which is not capable of using capacities created when firms interact with Mozal. What firms need is several institutional equivalents to Mozal, which can either be other large projects or an

industrial strategy that, amongst other things, coordinates capacity building and utilization.

One third of the firms, metal-engineering and electrical equipment industries, are involved in producing and/or servicing equipment and parts for the plant (Mozal). The same firms can do similar work for other large and growing industries in Mozambique (railways, sugar, Sasol, etc.). These linkages are not going to happen automatically because of limited capacities and the problem of fallacy of composition;⁴ at least are not going to happen fast enough and in the scale and scope that is necessary to develop continuous dynamic upgrading. Supplier firms will not invest if they do not have a market, and demand firms will not provide a market if they are not sure of the capacities of the supplier to comply with quantity, quality and timely delivery standards. Thus, uncertainty; imperfect information; limited business services; low financial, managerial, technological capacities and skills; inadequate labor skills, incentives, conditions and organization; deficient industrial organization and cooperation; are amongst the most important problems to be addressed for the potential linkages to happen. However, these issues are beyond Mozal, and need to be tackled through specific industrial strategies.

One quarter of firms interviewed provide crucial industrial services, some of which are completely or partially new, such as industrial waste removal and employee transports. In other cases, services are not new but have been significantly upgraded. Some of these services may reduce transaction costs to other firms and industries, such that they are a positive externality from Mozal that can be utilized strategically to develop a more diversified and articulated industrial structure.

Mozal is not only an opportunity but also an experience that deserves closer examination. This would allow learning business experiences and culture on an institutionalized manner, understand linkages better and how to develop and take advantage of them, improve on what has been done, do what has not been done. Working with Mozal has to go beyond taking advantages of opportunities; it has to

⁴ Firms may be capable of responding relatively quickly to one pressure, like Mozal, but would be much less capable to respond equally quickly to pressures coming simultaneously from different

include institutional and collective learning from the experience to do things better all the time.

2.6 *Indirect Employment*

We know that, upon full commissioning, Mozal created some 1000 permanent jobs for Mozambicans. Added to this are the nearly 6000 limited-period direct jobs that were created during construction. In addition to the direct jobs created, a large number of jobs have indirectly been created both on and off-site through subcontracts. To get an actual comprehensive number of jobs created specifically by Mozal would require a survey of every firm contracted and subcontracted, a task beyond the scope of this study.

However, we do know that an additional 1900 persons have or are currently working on-site at Mozal operations through contractors and subcontractors. Whether or not creation of these jobs can be attributed to Mozal is questionable, as is their sustainability.

Another source of indirect job creation stems from the activities of the Mozal Community Development Trust (MCDT). Since work began in January 2001, a reported 204 permanent and 202 temporary new jobs in the Beleluane area can be attributed to MCDT construction (schools, clinics, etc).

Moreover, increased consumption by Mozal employees induced by rises in individual wealth and disposable income is likely to have generated trade. How much of this trade creates linkages and multiplier effects in the Mozambican economy, and how much simply adds to imports and trade imbalances with neighboring countries, we do not know. To have a full assessment of this we would need to perform a closer examination of consumption patterns of workers, which may vary with income, culture, and so on. However, workers salaries and wages are one tenth of Mozal's value added to the economy; and half of consumption patterns paid by such income is

directions and for different jobs. Unless they become better firms and cooperate/subcontract, they will not be able to respond to a more dynamic market.

likely to be imports. If each wage generates 25% in value added through trade (which is a large figure, by the way), we come to the conclusion that indirect impact of wages through consumption may increase overall Mozal's direct value added to the economy from 2.5% to 2.6%. Probably, the costs of checking these data and arriving at a more rigorous and precise calculation would exceed the benefits.

2.7 Infrastructure

Public infrastructure investment was projected at nearly US\$ 16 million comprising roads, bridges, sewage, harbor quays, and water. This has spurred economic activity in Beleluane and broader Matola and Boane districts. However, this investment does not constitute a 'donation', as per the IPA costs up to USD15 million will be paid back via amortised deductions in the royalty payments to the state over 8 years. We would need to perform some basic financial calculations to assess the opportunity costs of following this model for infrastructural development. However, the matter at stake is not this, because at the time the government was in no conditions to finance the required infrastructures, and Mozal is not a "donor" to offer infrastructures, for free, to the Mozambican economy.

The points at stake are two, and very different ones. First, is Mozal's business positive to the economy as a whole? So far, the answer seems to be "yes". Hence, if infrastructures are required, they should be developed. Second, are there externalities from these infrastructures to the rest of the economy? The answer, here, is more ambiguous. On the one hand, there is potential for strong positive external effects in some of the infrastructures: roads, electricity and water supply, and so on. The industrial park that is being developed around Mozal can become a platform to further industrial development and reduce marginal investment costs. However, on the other hand, whether these positive externalities actually take effect depends more on what happens to other firms and investors, than on what Mozal does. If the rest of the manufacturing sector continues stagnant, then the potential for positive external effects will be greatly underutilized.

Recuperation of public infrastructure notwithstanding, Mozal has made additional direct contribution to public social infrastructure of the Bebeluane/Djuba locality through certain activities of the MCDT. Specifically, the Trust has funded outright the construction of 14 new school classrooms, a clinic and new maternity/midwife facility, and a police station; and is currently building a new secondary school that will ultimately accommodate up to 1800 students who now travel up to 20kms for their nearest school.

However, maintenance and operation of these new installations will be the financial and administrative responsibility of the government – representing a burden on an already constrained budget. In some areas, not only will monetary resources be shifted, but social resources as well. For example, new schools demand new teachers and materials, and where there is no increased budget to pay additional new teachers, they will be pulled from other schools - thereby diluting the educative strength. A similar scenario could occur with regard to medical personnel and resources.

Thus, the development of social infrastructure has to consider its impact on recurrent costs and how to finance them. There are many examples, related to the aid business, of social projects being rendered costly and unsustainable despite the fact that capital costs are financed through aid. It would be better to plan such activities with the government in a manner that builds sustainability, rather than creating additional pressures that the government cannot cope with. Alternatively, recurrent costs, or at least part of them, have to be internalized by the project, or the government will have to succumb to pressure from the stronger, which is not an adequate way of building social development. While it is perfectly understandable why Mozal requires rapid action, one should recognize the risk to the overall sustainability of a system of governance built on defensive and unsustainable response to corporate pressure.

2.8 *Human Resources*

Like infrastructure, Mozal made a large investment in training – both for project and operations. In the case of construction of Mozal 1 and the expansion, 5259 and 3136 individuals respectively were trained in 37 trades in the following categories: civil

engineers, electrical, instrumentation, mechanical, pipe fitting, refractory bricking, and structural steel. Training was carried out at the Machava institute in partnership with Instituto Nacional de Emprego e Formação Profissional (INEFP) against South African industry standards. Total costs for training of phase 1 were US\$ 3.7 million, and expansion project expenditure for the upgrade and equipping of the center, and continued training, totaled US\$ 3 million. Ultimately, buildup in these demanded, transferable skills created an industrial human resource base, formerly unavailable in Mozambique.

Separately, training for Mozal Operations, is being executed through a Maputo facility, also in partnership with INEFP. Through year-long bursaries, candidates are trained in electrical or mechanical trades and become certified as either operators or maintainers. As of June 2003, 55 have graduated from the Center. Reflecting a broader demand for such skills, and forecasting the Center's sustainability beyond Mozal alone, the training center is now hosting candidates sponsored by SASOL. In addition, 4 INEFP staff are being trained as trainers-of-trainers, and 2 as administrators/managers.

However, as in public infrastructure, Mozal's net financial contribution to training will ultimately be offset by its recuperation of outlay through deduction in royalty payments (not to exceed 5% of those payments per annum).

Nonetheless, the direct financial contribution of Mozal to training is not the main issue in the analysis of external effects. The scale of the external effects of training financed by Mozal depend, ultimately, on the demand for the labor and skills that have been developed that determines their worth to the economy as a whole. Thus, if the rest of the economy cannot absorb these labor and skills because of the current level of economic stagnation, particularly in manufacturing, then the size of the external effects will be very small. The potential for positive externalities will be there for sometime, but the real contribution of such externalities to the economy depends on how intensively they are utilized and explored by other industries.

A comprehensive human resource tracking survey, which looks at the pre- and post-Mozal employment and wage experience of each individual to come through the

Centers (construction and operation), would better inform the discussion of long-term labour impact. However, it would be worth repeating what as already been said before – Mozal may create other business opportunities and externalities; but the ability of taking them over and materializing them is as much an economic, as a technical and political issue, that goes beyond Mozal and the limits of this study.

Another important aspect to consider is that labor conditions are very important for productivity and quality, and Mozal has shown this clearly. These conditions involve labor organization, health and safety standards, incentives and salary levels and dynamics, provision of training and right working and learning institution framework, provision of social facilities and support, labor participation in management, monitoring and evaluation, and so on. This also involves the organization of tasks and clarity of duties, cooperation in production, monitoring and evaluation, clear definition of procedures and standards and the construction of necessary conditions to implement them. Mozambican firms cannot become competitive by cutting labor costs through low wages, bad working conditions, by not training and supporting workers, by not respecting them and not getting them more involved in the life of the firm. Mozal provides an example that productivity is related to the quality of management, quality of workers, team work, adequate working conditions and people being motivated and prepared to work better.

2.9 *Environment*

The environmental externalities of any large industrial project will ultimately yield certain economic contributions and costs. While the broad scope for environmental impacts warrants its own study, three key issues are highlighted as economic externalities: (1) potential future costs of natural resource damage and job-related health problems; (2) institutional effects; and (3) development of best practices and new systems in areas such as safety equipment, recycling, and industrial waste removal. The analysis of these externalities requires expertise and specialist capacities that are far beyond our skills and experience. We can only recommend that such an analysis is carried out and its results integrated in the impact evaluation model.

3. Conclusions and Additional Research

A challenge in this analysis has been to assess the economic impacts of Mozal as a company, versus the economic impacts of Mozal as determined by its place in Mozambican economy. The analysis presented here does not seek to address or justify Mozal's role, or that of the 'Mega-Projects' as a group, in driving Mozambican national development strategy. Rather, the study argues that there are clearly areas of impact – direct and indirect – that can be seen to be both positive and negative.

At the same time, as Mozal matures, lasting impacts will come to light. Future impact is also dependent upon two issues: (i) the magnitude of the potential externalities; and (ii) the government and other public and private sector institutions' ability to maximize the indirect opportunities created by the dynamics of Mozal. In particular, the magnitude and dynamics of external (or indirect) impact of Mozal will depend on how the economy absorbs the externalities. This ultimately depends on policies and strategies that do not form part of Mozal's business.

Given the data we had access to, we conclude that Mozal operations:

- Has a 3.2% share on GDP, when indirect valued added is also included. How much Mozal contributes to growth of GDP depends on the relative growth rates of Mozal and of the economy, adjusted by Mozal's share of GDP;
- Has an even greater direct impact on the manufacturing industry: 49% of gross output; 29% of MVA; and almost two thirds of exports of manufactured goods.
- Has a very significant net positive impact on external trade, of up to US\$ 400 million per year at steady state, which, other things being equal, reduces Mozambique's trade deficit by up to one third;
- Has an important net positive impact on the overall balance of payments (about US\$ 100 million per year at steady state), though far smaller than on the trade balance (due to foreign investment costs). This can be improved by increasing the Mozambican component of inputs and services; and reducing transfers of foreign workers' wages and salaries (through substitution by

domestic workers and/or taxes on wages and salaries transferred), import of investment services and capital repatriation.

- Has the potential to create significant positive industrial externalities by providing a platform for the development of metal engineering and maintenance industries, as well as crucial industrial services, which may greatly reduce marginal cost of investment and, therefore, increase the attractiveness of investing in Mozambique in new productive sectors.
- Has the potential to induce further externalities through direct and indirect employment, social programs, and other mechanisms. However, their real impact and sustainability ultimately depend upon the ability of the economy to take advantage of such externalities, and the policies and strategies that are developed and implemented to materialize potential linkages.

We also found that construction and expansion of the site adds to Mozal's impact on economic growth, by rising Mozal's share of GDP to about 5%. However, construction is a means to an end, and a short lived activity. Therefore, it should not be considered as high as the production of aluminium and its externalities.

Finally, we found that Mozal's impact on public revenue is insignificant (0.5% against 3.2% of the share of Mozal in GDP). A higher contribution to public revenue would greatly improve Mozal's real impact on the economy, and this can be achieved through changes in the taxation agreement to increase slightly taxes on profits and annuities, turnover taxes, and taxes on local and foreign wages and salaries.

Throughout the report, issues warranting more in-depth attention and analysis were highlighted. These can be summarized as follows:

- Net present value analysis of the balance of payment impact for the life span of the project, with more precise data;
- The construction of more precise and longer term analysis of direct economic growth impact of Mozal. At the moment, figures are for very short term periods, and are strongly affected by the construction and expansion of the project;
- Product chain, case study analysis to identify the precise impact of external effects associated with subcontracting firms to support Mozal. This would

provide a much better base to assess what the indirect impact of Mozal, through demand, is.

- Indirect employment creation – comprising all contractors and subcontractors.
- Human resource tracking to assess indirect job opportunities and technology transfer created through skills and training, including labor that have moved to other companies or lost their jobs, as in the case of construction workers that are not permanently employed.
- Employee consumption levels and patterns, which may not provide any significant improvement in the analysis.
- Impact on the environment and institutional and technical capacity in environmental protection.

Appendix 1

Meetings List

Internal

Elmar Nel, Director of Procurement, MOT
 Daniel da Silva – Legal, MOT
 Phil Hynes – Director Mozal Project/Expansion
 Tomas Rungo – superintendent administration and risk, MOT
 Lesley Mpanza – superintendent HSE & community, MOT
 Alex Smith – Housing, MOT
 Mbuso Mbatha – Human resources, MOT
 Rex Niven – Project Manager (By telcon)
 Venter Malan – Reduction Services, MOT
 Terry Dwyer – Training, MOT
 Pieter Crous/Kobie Taljard – Maintenance, MOT
 Danie Murray – Casthouse, MOT
 Peter Wilshaw – Director General, MOT
 Alcito Mause – MCDT
 Chris Morkel – Administration and Finance

External

Gray Security
 Transaustral
 Thsala Mozambique
 Lavandaria Cinderella
 Interwaste
 SRMC
 Kempe/Metech
 Tubex
 Chemane
 Marcleusa
 Omega
 Antonio Macamo – CPI
 Zito de Sousa – Banco Austral
 Floreal
 MOTRACO
 TRAC
 EDM
 TDM
 SORADIO
 Forjadora
 Kaness
 Wade Adams
 Diesel Electrica
 Eures Support Services