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Executive Summary: Economic Effects of Indonesia's Mineral-Processing Requirements for Export

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Executive Summary

Under Indonesia's Law on Mineral and Coal Mining No. 4/2009 and Implementing Regulation No. 7/2012 issued by the Ministry of Energy and Mineral Resources (MEMR), a ban on export of unprocessed mineral resources will take effect in January 2014. This regulation applies to metal-based minerals, nonmetal-based minerals, and rocks and sets out minimum processing requirements for each type of mineral or rock. The stated purpose of this mandatory in-country processing requirement is to increase the value of the minerals for export and preserve the country's resource supplies.

This study looks at the three of the country's most important export minerals—bauxite, copper, and nickel—and evaluates:

1. Financial feasibility of downstream processing;
2. Economic welfare losses;
3. Economic implications of a forward-linkage policy; and
4. Other considerations related to smelting.

The report also provides recommendations for addressing possible negative consequences of the ban.

(1) Financial feasibility of downstream processing

The restriction on exports of unprocessed minerals under MEMR Regulation No. 7/2012 effectively compels mining companies to consider investments in additional smelting and refining facilities. One of the first questions about the impact of this export restriction is whether such investments are commercially viable.

It is difficult to make a business case for investments in smelters. Our analysis of the financial feasibility of further downstream processing of minerals in Indonesia finds that investments in greenfield smelting and refining facilities, in the market circumstances likely to prevail until at least 2020, have poor commercial prospects. There are, however, differences among the minerals examined.

> ***Investments in nickel ore processing are feasible and materializing***, but returns to greenfield smelting investments by themselves, without a mine attached, do not look remarkably profitable. What is more, all these downstream investments in mineral processing look much worse when considered in the light of the required investment in complementary infrastructure—power plants, ports, roads, and so on.

Investments in aluminum smelting are feasible and may attract investment as aluminum smelting adds some value. However, smelting is extremely expensive, especially in power and capital costs, which drives down profit margins substantially. Compared with bauxite mining, alumina and aluminum refining are low-return activities.

Investments in greenfield copper smelting facilities would generate exceedingly poor returns and thus are unlikely to materialize. Copper smelting adds little value, and treatment and refining charges (TC/RCs) and margins for smelters are extremely low.

Excess worldwide smelting capacity makes new greenfield processing ventures questionable. For all the minerals examined, there is substantial excess capacity in smelting/refining in world markets, which is driving down operating margins in these businesses. Chinese and Middle Eastern firms with low capital and low operating costs make it very difficult for new entrants to turn a profit.

Capital investments and operating costs required for greenfield smelters/refineries are extremely large. Capital requirements for building smelters continue to grow, which translates into high capital costs per ton of output. The opportunity costs of such huge capital investments in Indonesia, when there are pressing needs for capital investment in other areas, are extremely high. In addition, operating costs of greenfield smelters/refineries, and particularly energy costs, are also high.

Obtaining commercial financing for smelters will be challenging. Because of the large investments required in smelter/refinery projects, significant debt financing—possibly 50–70 percent of the cost of the project—may be required. Raising $500 million to $700 million of long-term financing will be challenging. The poor commercial prospects of new smelters/refineries will make it very difficult to obtain financing without some sort of government or corporate guarantee.

The government should recognize the significant differences among important export minerals highlighted in this report and conduct further analysis on other minerals before implementing the ban. The argument against an export ban in this study is not an argument against all downstream minerals processing. There are substantial differences between the minerals we examined. Some, like nickel, have high value-added in the processing stage and, if processed cost-effectively, could be good prospects for development policies. A wholesale export ban that neglects difference in minerals processing costs and the investments necessary to realize the processing objectives may not make sense if the goal is to increase domestic value added and export earnings.

(2) Economic Welfare losses

Indonesia would suffer a net welfare loss of about $6.3 billion per year due to the ban policy — This is a hefty price to pay for a policy that generates modest social benefits. On top of this, total net welfare losses would also include substantial government revenue losses in royalty and income taxes, which are not captured in the analysis (for example, Freeport reports they paid over $1 billion in income taxes in 2011, which might be lost should the ban be implemented). The report looks at three scenarios for new investments in

processing capacity, based on the MEMR's list of planned new processing investments in copper, nickel and bauxite that could occur after the ban and estimates the welfare effects of each:

- ***If there is no additional processing capacity*** – The largest net welfare losses occur in this scenario, when no new processing comes on stream and domestic prices of unprocessed minerals decline by 50 percent. Net annual welfare losses total $6.3 billion per year, and a deadweight efficiency cost to the economy of $1.5 billion per year is produced. Total export earnings, the direct professed target of the ban policy, fall by $6.0 billion per year.

- ***If there is some new processing capacity*** – Three years after the ban, when some processing capacity is forthcoming in nickel and bauxite, net welfare losses decline to $5.2 billion per year, but the deadweight efficiency burden to the economy due to the ban policy continues at a level of $1.5 billion per year. Total export earnings decline by $4.9 billion per year.

- ***If all of MEMR's Planned New Processing Investments Become Operational in 2020*** – when all MEMR's planned processing capacity is assumed to be operational in 2020, yearly net welfare effects of the ban finally become positive but only after tens of billions of dollars of losses. But total net welfare gains are modest, totaling just $832 million per year, given all the new processing capacity. Total export earnings increase by $1.3 billion.

The ban would lower domestic prices for ores and concentrates, significantly impacting the economy and miners and may make mining uneconomical. The ban would compel miners to sell their excess supplies of concentrates and ores to smelters at prices lower than the world price. The report uses two examples of prices declines: a 25 percent and a 50 percent price decline. Assuming a price decline of 50 percent, miners of unprocessed minerals would suffer revenue losses of more than $7.44 billion per year, beginning in 2014, because of the inability to export. A second part of the revenue loss to miners is an efficiency loss to the economy. This efficiency loss arises because the unprocessed minerals that would have been exported under free trade, earning the world price, would have cost only an amount equal to the marginal cost of production to produce. Under the export ban, these exports would not be produced and sold on the world market for more than it cost to produce them. This represents a net efficiency loss (or "deadweight" loss) to the economy of more than $1.5 billion.

The ban could lower government revenues from royalty taxes by as much as $300 million per year. As exports and production of unprocessed minerals fall, government tax royalty revenues would fall. The study estimates that in the case where no additional processing capacity is forthcoming after the ban and unprocessed mineral prices fall by 50 percent, the magnitude of government revenue losses due to a decline in royalty taxes would be in the order of $300 million per year.

The ban could also lower government revenues from income and other indirect taxes by as much as $1 billion per year. This estimate of royalty tax losses is just a small subset of the government revenue losses that would occur (1) because there are income taxes on

company revenues of miners and processors, and (2) because there will be indirect tax effects: other companies in the industry will be affected by the decline in mining exports and any increases in processing capacity. Based on reasonable estimates of profits and tax rates, the government could lose between $1 billion and $1.2 billion per year from the ban in total income taxes.

The ban would have a substantial impact on export earnings in the short-run and those incurred losses offset any benefits after 2020. The report shows that with substantial processing capacity coming on line, the ban may increase export earnings by $1.3 billion a year by 2020. But when we offset these export earnings with the total deadweight efficiency losses of $729 million caused by the ban policy, the result for 2020 does not look impressive and is small compared to the losses from 2014 to 2019.

(3) Economic implications of a forward-linkage policy

The report looks at the idea behind the export ban strategy that it is a logical, natural progression for a country exporting raw materials to move downstream into the processing of these materials, and therefore policies encouraging such downstream processing can improve trade performance and accelerate structural transformation of the economy.

With increasing trade, domestic linkage possibilities do not automatically convey an advantage to developing resource-based production. Forward-linked industries, such as basic minerals processing, can be established in any country able to import the unprocessed resource. Only if home processing can supply the downstream product at lower cost (or reduce the risk of supply disruptions) can it be argued that it is advantageous to invest in developing the forward-linked industry at home. The cost factor in the calculation is determined by comparative advantage and technological differences. In terms of static comparative advantage, Indonesia's factor endowments (and technological capabilities in some cases) do not give it any cost advantages in highly capital intensive industries, which (1) require enormous capital investment (2) necessitate huge complementary investments in infrastructure, and (3) employ a small portion of the country's large workforce.

Declining transport and ICT costs allow countries to more easily integrate into global supply chains. Since minerals processing reduces the weight of the resource and raises the value, transport costs generally favor processing near the mine (the impact of transport costs, however, depends somewhat on the mineral's characteristics and on its stage of processing—for example, shipping rates for aluminum ingots are higher than for bulk cargoes such as alumina). But the decline in international transport costs over the decades has significantly reduced these incentives to process near mines. Key determinants of the location of smelters/refineries for many minerals revolve around the need for complementary inputs like low-cost power, access to land, pollution controls and other regulatory requirements, access to low-cost finance, external economies, markets for by-products, and so on, rather than simply transport costs.

The key to industrialization and job creation is the ability to integrate in global supply chains and not trying to do it all yourself. Separate links in the production chain have made it much easier to combine advanced-nation technology with developing country low-cost labor. Driven by lower transport and coordination costs, goods are no longer "packages" of a single country's factor endowments, technology, social capital, governance capacity, etc. Goods are now "packages" of the factor endowments, technology, social

capital, and governance capacity of many countries. Trade patterns and performance of most countries are now shaped by their position in an international production chain. In the supply chain for a particular product, design can take place in one country, technology and management can come from another country, component parts can be produced in a third, and final assembly can take place in a fourth. This kind of trade involves continuous, back-and-forth flows of factors of production between countries that used to take place within countries, factories, and offices.

Integrating into global value chains allows for easier and faster industrialization. The transformation of trade has made the process of industrialization much simpler for developing countries. Prior to the ICT revolution, it was not possible to develop a world-class industry unless a country had a well-developed industrial base, the technical capabilities of which took decades to build.

The requirement to build a whole domestic production chain from the ground up is no longer necessary. Individual links in the chain can now be more easily sourced competitively—technology, management, quality control, and marketing—allowing countries to focus on producing one product as competitively as possible. Obtaining such world-class technology can modernize segments of a developing country's industry almost overnight. Similarly, high cost links of the vertical production chain, which lack comparative advantage, can more easily be out-sourced and a country can concentrate its efforts on more competitive activities, raising aggregate industry productivity and growth.

The fragmentation of production makes getting industrialization started and moving up the value chain easier. As long as a country has a workable import-export platform—a good business environment, reliable, low-cost workers, and basic infrastructure, it is able to do business. There is also an important neighborhood effect, as noted above. Being part of a fast-paced, industrializing region, such as Asia, with its highly-fragmented supply chains, is a big plus. Many more opportunities are available to acquire off-shored production links and to out-source others.

Research shows that policy interventions to encourage downstream processing to diversify exports and improve trade performance are ill-advised. Forward linkages are just not important in determining patterns of world trade and changes in these patterns. International experience shows that new exports spring up more from lateral activities that are closely related in terms of technology, factor intensities, and capabilities, than they do from vertical activities connected in production chains. Forward linkages are also shown to play an extremely small part in international export successes. Likewise, arguments claiming that proximity of natural resources and transport cost savings are reasons for promoting downstream processing do not correlate with cross-country evidence.

There are opportunity costs to policy choices. Adopting a linkage-based strategy to promote export development means other policies that might be more productive in stimulating the emergence of new higher value exports will not be pursued. This is a bad trade-off, as better opportunities are more often "lateral" than "downstream". As a rule, linkages appear to be a poor guide for formulating export development policy. Forward linkage-based policies are shown to go against international experience, and they do not

make much sense in a world where trade costs have fallen substantially and supply chains make it much easier to in-source and out-source links in the production chain.

(4) Other Considerations

Complementary public investments in electricity and other infrastructure required for smelters/refineries are very large. In order for smelting to be viable, the government will need to make necessary public investments in roads, electricity, ports and other necessary infrastructure. Given the current challenges in getting budgets for infrastructure projects approved, these necessary complementary investments might not materialize in time. In addition, the public investment part of the package has to be justified to taxpayers on the basis of a comparison with other public investments. Would investing in a power plant, road, or a port to support a copper smelter produce a bigger social or economic bang-for-the-buck than investing in a school, or a hospital, or even a power plant to support more investment in other economic areas, such as labor-intensive manufacturing? If not, then investment in the smelter is questionable.

The time needed for development of smelters is well past the implementation date of the law. The normal gestation period for investments in smelters and refineries for aluminum, copper, and nickel is seldom less than five years. Unless a plant is nearing completion early in 2013, there is little chance for that plant becoming operational by 2014 when the ban is supposed to come into force. One has to be skeptical of the list of processing ventures under implementation issued by the MEMR in March 2012. It provides dates for entry into production for 16 projects, 11 of which are expected to be operational in 2014 or earlier. As pointed out in the discussion of aluminum and copper, completion of the investments will take much longer than envisaged, and few, if any, of the 11 projects will be completed by the indicated time.

Importing final processed mineral products can be economically more efficient and help create more jobs than investments necessary for smelting. Considering all the economic, investment and environment repercussions of a policy banning the exports of minerals, importing the final products for use in downstream industries may be the best way to go. Metal prices are set on metal exchanges, so smelting in Indonesia at higher costs than on offshore plants may in fact destroy value of the minerals as inefficient and higher cost smelting cuts into the final metal prices on the international metal exchanges.

Environmental consequences of smelting are high. If not correctly controlled, smelting can cause significant environmental damage (e.g., air emissions and acid rain).

Smuggling of unprocessed minerals would likely increase. The decline in domestic prices of unprocessed minerals that would come about after the ban would increase incentives for smuggling minerals out of the country. This would be a problem the government would need to address. This would increase the necessity for more police involvement, not lessen it, as some have argued.

Little employment would be generated from such high investment necessary to realize smelters. Public investments could potentially be directed towards activities that generate much more employment. Smelting is energy-intensive and generates exceedingly small employment numbers: for aluminum, a US $2 billion investment in an alumina refinery would generally employ only 500; a US $3.5 billion investment in an aluminum smelter would employs an average of only about 1,000 workers; for copper, a US $1.2 billion

investment in a copper smelter would employ an average of only about 800 workers; for Nickel, a US $1.7 billion investment in a nickel smelter would generate only about 450 workers.

Recommendations

Avoid blunt, across-the-board policies, to compel downstream investment in processing, in all minerals whether it is economic or not. If downstream processing is to be pursued as a policy it should be (1) selective and (2) based on "first-best" economic principles to avoid collateral damage. That is, if downstream processing in a particular mineral looks profitable and has promise in raising export earnings, then the "first-best" economic policy would be to target policy interventions on the problem of processing this mineral directly, rather than using indirect restrictions on all exports of unprocessed minerals to subsidize downstream processing of it via falling domestic prices of inputs.

Use selective policies, aimed at downstream processing in specific minerals with profitable investment profiles. A better approach than a sweeping export ban on unprocessed minerals would be a selective policy, aimed at downstream processing in specific minerals with profitable investment profiles and with some competitive promise in raising export earnings.

Focus on fiscal policy rather than the production side of the minerals industry. In general, the best thing for policymakers to do to get more out of the country's natural resource endowments is to focus on fiscal policy rather than the production side of the minerals industry where distortions can be costly. Changes in the royalty and income tax regime would appear to be the most effective, least costly policy approach