

## Rare earth – no case for government intervention

Georg Zachmann, 8 November 2010

China has officially restricted exports of rare earth for several years and announced this year it will further tighten exports. Rare earth is a group of 17 different metals, usually found clustered together. These metals have hundreds of different industry applications. For example, they are used in certain high capacity magnets, batteries and lasers. As the rare earth elements are used in sectors that are assumed to have an over-proportionate growth potential (eg. green-technology), policy makers are paying particular attention to them. In the policy debate, the different elements are considered jointly, as they are typically clustered together. But each element has its own supply and demand characteristics. Consequently, prices for the individual elements might differ by factor 20 (in mid 2010, Samarium was quoted at \$32 per kilogram while Terbium was quoted at \$600).

As China is currently the predominant producer of rare earth (>95% of total production), the reduction of Chinese rare earth exports will have effects on global supplies. Thus, rare earth elements have been very actively covered in the media and various G20 policy makers (secretary of state Clinton, chancellor Merkel, etc.) have expressed their concern. Business interest groups want to put rare earth on the official G20 agenda – regardless, the issue will be unofficially discussed in Seoul. But should policy makers really care?

This depends on what China wants to achieve by restricting rare earth exports. Chinese export restrictions for rare earth could be interpreted in five different ways:

[1] *China wants to save rare earth resources for future generations.* As rare earth elements are abundant in both China and the rest of the world, this is a rather unlikely explanation. But even if easily produced sources are rare, a slow exploration for fear of overexploitation should not merit political concern, as the Chinese interest of a stable, long-term supply would be aligned with the global interest.

[2] *China uses rare earth to exercise political influence.* The current case-in-point is a supposed freeze in exports to Japan, allegedly due to political disputes. In Foreign Policy, **Tim Worstall** argues convincingly that rare earth elements are an unlikely tool for exercising political pressure as they cannot be effectively monopolised by China. The reason is, that rare earth can be produced in many different countries (China only holds about one third of the known resources), admittedly at higher cost.

[3] *China is trying to reduce the ecological impact of rare earth production.* The production of rare earth in China is very environmental unfriendly and hazardous for the corresponding workforce. Consequently, Chinese export reductions might be a move to reduce the price paid by workers and the environment for growth going elsewhere. In this context, export reductions might be an important tool to gain control of production in illegal mines. Even though paying higher prices for rare earth would not be appreciated by the Western industrial consumer, correctly pricing pollution and labour are well-accepted principles in Western countries.

(4) *China tries to maximize the profits from exporting rare earth.* As in the short-run Chinese rare earth could only be replaced by producers with significantly higher costs, China is currently able to increase its profits by restricting exports of rare earth as the decreased export volumes are offset by the increased prices. Numbers quoted in the press, arguing that in 2010 a 30% decrease in exports occurred while prices increased threefold, would be consistent with a profit maximisation strategy. Extracting monopoly rents on natural resources is common around the globe. Most oil producers for example employ duties on oil exports to ensure that the fuel is exported at prices above the production cost. Such a profit maximisation is constrained by the entry of new suppliers. If China raised the price above a certain level, profit seeking mining companies would start producing non-Chinese rare earth resources (eg. in the US or Australia). Consequently, either China keeps the price slightly below the entry threshold or a limited number of producers would secure stable supplies of rare earth at prices supposedly somewhat above the production cost of the most expensive supplier.

(5) *China is using export restrictions for domestic industrial policy reasons.* Restricting exports lead to a de facto double pricing. Domestic prices of rare earth would drop, while foreign prices would rise. This would give domestic high-tech producers a cost advantage over their foreign competitors. This last point has been the most discussed in recent months, as it seems to be in line with China's mercantilist economic policy. This raises the question: Could such a strategy be successful? And would this harm Western economic interest? Subsidizing Chinese high-tech companies' by double-pricing rare earth could of course be effective in increasing these companies' world market share or profit in the short run. This does not mean, however, that such an intervention is efficient.

First, higher world market prices will make other rare earth sources available. Consequently, the current cost spread between China, which is producing on a large scale, and the rest of the world that currently is not, will not persist. High prices will thereby not only drive the exploitation of new non-Chinese resources, but also encourage the development of new technologies for exploring, producing and processing rare earth (the separation of the different rare earth elements is one of the most costly parts of the production process). Consequently, market forces are likely to drive down Western production costs in the mid-term.

Second, due to the export restriction, the demand for Chinese rare earth would be artificially low. This would lead to the intended lower price for rare earth. Chinese investors would make their decisions with respect to the internal price, as Chinese companies would need two commodities for exporting: the rare earth valued at the domestic price and the export rights valued at the price differential between internal and external market. Therefore, it should play no role, whether the export rights are allocated for free to some companies or auctioned off. The low Chinese rare earth price, however, would distort the incentives to invest in new resources and technologies in China.

Third, in many applications, rare earth elements might be replaced. If, for example, the cost of certain rare earth magnets became too high, companies might decide to use lesser quality magnets. Thus, wind turbines will continue to be built in Western countries, even though replacing the rare earth magnets might imply some efficiency losses. This is reflected by the rather small share of the rare earth cost in the value of most total products. The total market value of separated rare earth is

several billion dollars (USD), while the value of iron ore is a few dozen billions and crude oil several trillion. Thus, the price of rare earth is unlikely to be a key driver for the location of most downstream value chains.

Fourth, a subsidisation of rare earth would be intended to allow lower prices at the next stage of the value chain (eg. rare earth magnets). To achieve the industry policy goal, it would be necessary, however, to also ensure that these intermediate products (magnets) are not exported in order to allow cheaper products at the subsequent stage (eg. generators) and so forth. Thus, an entire sector would be created on incorrect relative prices. In other words, it is more profitable to use a cheap machine that wastes some of the rare earth than to install a more expensive machine. The corresponding overuse of rare earth and rare earth products would make the entire value chain uncompetitive as soon as rare earth cost inside and outside China converge.

Double pricing will lead to opposing effects in China and the West. In China, the underinvestment in mining and the wasteful use of rare earth will increase demand and decrease supply. In the West, the overinvestment in supply and the substitution of rare earth in some areas will decrease demand and increase supply. Consequently, markets alone will force rare earth prices in the West and China to converge. [Furthermore, double pricing is difficult to sustain as it implies internal redistribution. When double pricing is effective, the right to export becomes very valuable. In this case, the worse-off companies would oppose the scheme and might find ways to circumvent it.] Therefore, restricting the export of rare earth is unlikely to prove an efficient tool for attracting highly-skilled and capital-intensive, high-tech industries.

So what do Western companies have to fear? Companies in all sectors know that depending on only one supplier of a crucial input can be very painful. Thus, companies can choose between vertical integration, contracts that reduce the risk of hold-up or diversification. The first two options are not very viable, as Western companies are unlikely to either strike renegotiation-proof deals with Chinese companies or even integrate Chinese suppliers. Thus, diversifying supplies by either contracting some volumes with alternative suppliers, building up stocks, financially hedging against increasing prices or even buying into rare earth production projects should be the answer for industrial users of rare earth. The optimal degree of diversification can only be delivered by the market. The reason is that the willingness to pay for diversification largely depends on private information about the individual companies' cost of decreasing rare earth consumption. Furthermore, the large number of consumers from different countries should assure the development of a sufficiently liquid market for rare earth. Thus, the market will provide a close-to-optimal level of production capacity and stocks. [As for most natural resource markets, there will be some concentration on the supply side due to the high optimal size of the mines leading to prices above production cost.] Therefore, government support to rare earth consumer, administrative stocks to smooth market prices or government support to increase non-Chinese production would make things worse by punishing companies that invested in risk mitigation.

As double pricing will be an inefficient industrial policy and markets will deliver sufficient rare earth supplies outside China, Western governments should restrain from protectionist countermeasures



or unjustified counteroffers. That being said, trading the opening of the Chinese rare earth sector against the opening of another G20 or WTO market (eg. agriculture) would be a win-win situation.