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Contrasting perspectives on China's rare earths policies: Reframing the debate through a stakeholder lens

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HIGHLIGHTS

- Very different perspectives persist regarding China's rare earth policies.
- Scarcity, substitutability and uncertainty drive the divergent perspectives.
- We compare China to a socially responsible corporation, "China Inc.".
- China's internal stakeholders have higher salience than ROW.
- We propose and reframe policy mitigation strategies.

Keywords:
Rare earth ele\ments
China
Stakeholders

ABSTRACT

This article critically compares China's rare earth policy with perspectives upheld in the rest of the world (ROW). We introduce rare earth elements and their importance for energy and present how China and the ROW are framing the policy debate. We find strongly dissonant views with regards to motives for foreign direct investment, China's two-tiered pricing structure and its questionable innovation potential. Using the metaphor of "China Inc.", we compare the Chinese government to a socially responsible corporation that aims to balance the needs of its internal stakeholders with the demands from a resource-dependent world. We find that China's internal stakeholders have more power and legitimacy in the REE debate than the ROW and reconceptualise various possible mitigation strategies that could change current international policy and market dynamics. As such, we aim to reframe the perspectives that seem to govern the West and argue in favor of policy formation that explicitly acknowledges China's triple bottom line ambitions and encourages the ROW to engage with China in a more nuanced manner.

1. Introduction

Rare earth elements (REEs) are a group of metals with unique properties that make them indispensable in many high tech products, in the clean technology sector and in various defense applications (Angerer et al., 2009; Bailey Grasso, 2012; BGS, 2011; Bruno, 2012). Given the growing economic and the persistent strategic importance of these sectors, both in the developed and the developing world, continuous access to these resources is both commercially (Ad-hoc working group on defining critical raw materials, 2010; Defra, 2011b; US Department of Energy, 2011), and strategically important for many nations (US National Academy of Sciences, 2008; US National Research Council, 2008). Moreover, following the expected growth in clean technologies, the demand for rare earths is expected to rise in the near future (Buchert, 2011; Hoenderdal, 2011). For the moment, China is the only country that combines operational rare earth mines with the necessary technology to mine them so that the country controls between 95 and 97% of the rare earth market (Long et al., 2010; Tse, 2011; USGS, 2011). China's supply dominance and exertion of market power are worrisome to many governments and companies around the world (Bradsher, 2010a, 2010b, 2010c; House of Parliament, 2010; Vateva, 2012). Resource-dependent countries and firms are therefore looking for different ways to engage with China and ensure sufficient and stable supply in the short and long term (Eddy, 2012; Haxel et al., 2002; Hirokawa, 2011; Hook et al., 2012).

In many debates and discussions, China is depicted as the bogeyman that abuses its market power and infringes trade agreements (Buijs and Sievers, 2012; Morrison and Tang, 2012; Nasir, 2012; Plumer, 2011; Weslosky, 2012). However, a more balanced approach that investigates the facts and the figures

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without all the hot air will be beneficial to all stakeholders involved (Seaman, 2010). To do so, we investigate whether China's rare earth policy could be understood as a socially responsible strategy that balances environmental, social and economic needs catalyzed by stakeholders or whether it is a strictly economic, resource-nationalist strategy driven by China's current dominance in rare earth elements (REEs).

After sketching the components of the rare earth sector through the lenses of the policymakers of China and the ROW, the disagreement is epitomized in three distinct areas: (1) China's export strategy characterized by quota and 'anti-competitive' pricing; (2) China's alleged lack of innovative capacity; and (3) China's ambition to attract FDI by exercising resource nationalism. To analyze this discourse, we introduce the China Inc. metaphor using a strategic management framework. Our analysis of stakeholder salience in terms of power, legitimacy, and urgency (Mitchell et al., 1997) depicts the ROW as a dependent stakeholder, whereas local authorities, local civil society and the central government are found to have higher salience. This conceptualization inspires us to develop suggestions of how the ROW can strategically adapt to and partially overcome China Inc.'s dominant position.

2. The issue with rare earth elements: local scarcity, no substitutes and uncertainty

Despite their name, rare earth elements (REEs) are not really rare (Haxel et al., 2002), but their high dispersion throughout the earth's crust has resulted in *only a handful of locations* with high enough concentrations for economically viable mining operations

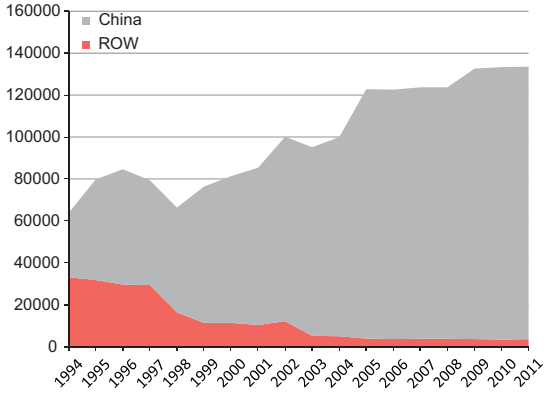

Fig. 1. REE production in China and the ROW (adapted from Long et al., 2010).

(Schoolderman and Mathlene, 2011). Additionally, the mining and production of rare earths has moved from Mountain Pass, California, where environmental damage and production costs were too high, (Long et al., 2010; Tse, 2011) to China, where development has been encouraged ever since Deng Xiaoping recognized REEs as an important strategic resource. This sparked significant investments in China's knowledge and technology base (Hannon et al., 2011; Haxel et al., 2002; Hurst, 2010; Seaman, 2010), which has led to what is sometimes called "China's rare-earth stranglehold" as shown in Fig. 1 (Plumer, 2011).

China has thus become the de facto producer, user, and exporter of REEs (Kingsnorth, 2011), with the USA, Japan, Germany and France as the key importers (see Fig. 2) (BGS, 2011; UN Comtrade, 2009). The problematic nature of this import-dependency is accentuated by China's questionable control of corruption, regulatory quality, political stability, voice and accountability as measured by the worldwide governance indicators, where China ranks between the 25th and 50th percentile, with an average of 29.7/100 (Kaufmann et al., 2010). Based on such information, nations have started to stress the importance of diversified rare earth metal portfolios for domestic imports.

Secondly, REEs have *no known alternatives or substitutes* (Hoenderdal, 2011; Holliday et al., 2012), which in combination with high lead times for mine development (Kidela Capital Group, 2010) and the lack of production and refining capability outside of China, reinforces the power-dependence relationship between China and the ROW (Humphries, 2012). The appeal of REEs lies in their unparalleled electrical, optical, magnetic, and catalytic applications that significantly improve energy efficiency and aid in miniaturization thereby decreasing environmental impacts, which is why they are used in many high-tech, cleantech and precision applications as shown in Tables 1 and 2 (Angerer et al., 2009; BGS, 2011; US Department of Energy, 2011; USGS, 2011; Wouters and Bol, 2009).

Thirdly, there is considerable *uncertainty* about the quantity and location of rare earth reserves. The following figure compares the data on anticipated REE reserves as produced by the Chinese Society of Rare Earths and UK-based Roskill (Zhanheng, 2011) with data from the United States Geological Survey (USGS) on proven reserves (Long et al., 2010).

While the definition of proven and anticipated reserves differs, the various sources seem to distribute responsibility in different ways through the use of different reserves definitions. Following Zhanheng (2011) China holds less than 23% of global reserves and Brazil holds almost 32.5%. Long et al. (2010) argue that China holds about 36% of global REE reserves and attribute only 0.05% to Brazil. Korinek and Kim (2010) discuss the reserve base for rare earths as

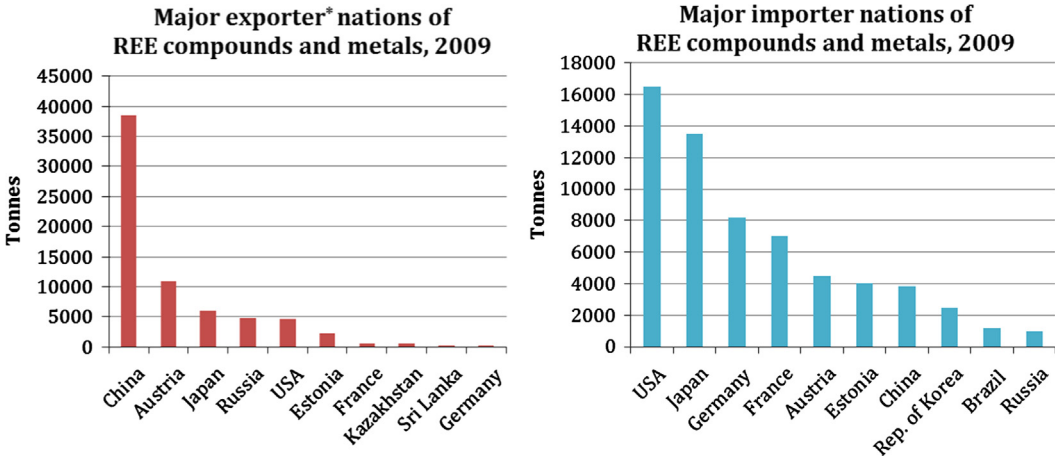

Fig. 2. Major exporters and importers of REEs (adapted from UN Comtrade, 2009).

Table 1
Rare earth elements: categorization and use.

Rare earths		Atomic no.	Category	Commercial use
Scandium	**Sc**	21	Heavy	Stadium lights
Yttrium	**Y**	39	Heavy	Lasers, red coloring in screens
Lanthanum	**La**	57	Light	Electric car batteries, hybrid car engines
Cerium	**Ce**	58	Light	Lens polishes, auto catalyst, petroleum refining
Praseodymium	**Pr**	59	Light	Magnets, searchlights, aircraft parts
Neodymium	**Nd**	60	Light	High-strength magnets, wind turbines, hybrid electrical vehicles, hard drives in laptops, headphones, petroleum refining, auto catalyst
Promethium	**Pm**	61	Heavy	Portable X-ray units
Samarium	**Sm**	62	Light	Glass, magnets
Europium	**Eu**	63	Light	CFL bulbs, red coloring in digital screens
Gadolinium	**Gd**	64	Light	Neutron radiography, magnets
Terbium	**Tb**	65	Heavy	High-strength magnets (permanent magnets)
Dysprosium	**Dy**	66	Heavy	High-strength magnets (permanent magnets)
Holmium	**Ho**	67	Heavy	Glass tint coloring, lasers
Erbium	**Er**	68	Heavy	Metal alloys
Thulium	**Tm**	69	Heavy	Lasers, medical X-ray units
Ytterbium	**Yb**	70	Heavy	Stainless steel alloys
Lutetium	**Lu**	71	Heavy	Catalyst in petroleum refining

Table 2
Industry-specific rare earths.

Rare earth products	REEs	Clean Tech Usage	Specific applications
Magnets	Nd, Pr, Tb, Dy	Samarium–cobalt magnets, neodymium–iron–boron magnets (2.5 times greater magnetic energy than samarium–cobalt), size reduction (neodymium use in speakers, earphones, MP3 players), hard disks, DVD drives	Motors, disc drives, MRI, power generation, wind turbines, microphones, speaker, magnetic refrigeration
Metallurgy	La, Ce, Pr, Nd, Y		NiMH batteries, fuel cells, Steel, Lighter flints, super alloys, aluminum magnets
Phosphors	Eu, Y, Tb, Nd, Er, Gd, Ce		LCD displays, fluorescent lighting, medical imaging, lasers, fiber optics
Glass and polishing	Ce, La, Pr, Nd, Gd, Er, Ho		Polishing compounds, colourisers, UV resistant glass, X-ray imaging
Catalysts	La, Ce, Pr, Nd	Increase effectiveness, enable reactions to run at high temperatures, reduce the amount of platinum required (reducing costs), fluid cracking for refining crude oil	Petroleum refining, catalytic converts, diesel additives, chemical processing, industrial pollution scrubbers
Ceramics	La, Ce, Pr, Nd, Y, Eu, Gd, Lu, Dy		Capacitors, sensors, colorants, scintillators, refractories
Nuclear/ Defense/ Water treatment	Eu, Gd, Ce, Y, Sm, Er, Nd, Dy		Water treatment, pigments, fertilisers

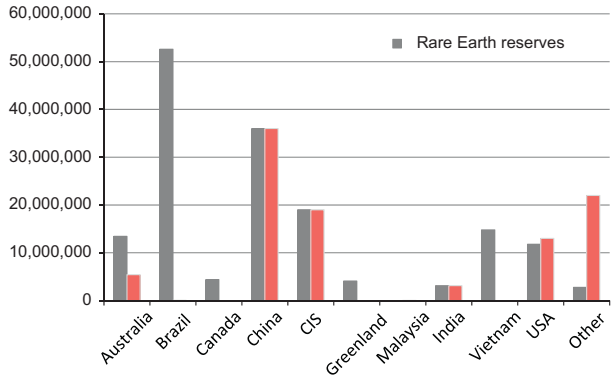

Fig. 3. Differing definitions of rare earth reserves.

well and state that 57.71% is to be found in China, 13.62% in FSU and 9.1% in the USA. This suggests a varying distribution of responsibility from the actors involved. China's data suggest that Brazil's anticipated reserve quantities have the potential to be exploited, thus reducing the current reliance on China. The USGS data, on the other hand, suggests that China's proven reserve dominance warrants their role as global provider of rare earths (Long et al., 2010; see Fig. 3). Despite these differences, it is unanimously agreed that China produces 95–97 percent of REEs used in downstream end-user products. It is also generally accepted that the deposits in China are plentiful in heavy rare earths, and estimated to contain 80 per cent of the world's heavy rare earth elements (BGS, 2011; Long et al., 2010; USGS, 2011). With the relatively recent boom in the use of REEs, especially driven by rapid development of clean technologies and high-tech applications, REE usage is likely to increase in the future (Alonso et al., 2012; Ayres and Talens-Peiro, forthcoming; Buchert, 2011; Hoenderdal, 2011). This estimated demand increase for resources with unique, hard-to-imitate-and-substitute properties can create a sustainable competitive advantage for the resource owner (Barney, 1991), while countries and organizations that need such resources end up in a position of dependence (Pfeffer and Salancik, 1978). This power-dependence relationship (Emerson, 1962) is fundamental to understanding the dissonant perspectives in China and the ROW. We now present the perspectives of the ROW and China. We expose and oppose the different viewpoints and then use the stakeholder framework from Mitchell et al. (1997) to analyze the salience of China's internal and external stakeholders

on the dimensions of power, legitimacy and urgency, which opens avenues to reframe to existing debates.

3. The ROW perspective

Numerous documents have been produced by governmental agencies in the ROW that discuss resource availability (BMWi, 2010; COM, 2008, 2011; Defra, 2011a, 2011b; Haxel et al., 2002; Long et al., 2010; Turner et al., 2007; UNEP, 2011; US Department of Energy, 2011; USGS, 2011). Additionally, resource availability has been presented as a critical issue for companies by consultancies and associations, which exhibits its importance not only on a governmental level but also at the corporate one (EEF, 2012; Ernst & Young, 2011; Schoolderman and Mathlene, 2011). Schillebeeckx and George (forthcoming) have argued that governments engage in shaping, stabilizing and bridging of the resource space; through policy initiatives, lawsuits before the WTO, establishing partnerships with other resource rich countries, setting up platforms of cooperation, promoting innovation and R&D, providing financial incentives for new mine development, stockpiling and other activities, different governments aim to ease their dependence on the supply of scarce or critical minerals such as REEs. A recent publication from Polinares, a European think-tank on natural resource policy, provides a useful overview of the three key worries of the ROW (Buijs and Sievers, 2012).

Firstly, China has shown its ability and willingness to use its control of the REE market for political purposes. Although Beijing never admitted to any involvement, it is broadly believed that China strategically withheld deliveries of REEs to Japan when a Chinese fisherman was detained by Japanese authorities for fishing in waters that have long been a source of dispute over ownership between the two countries (Bradsher, 2010b). Following this action, exports to the US and the EU were delayed, officially for tighter inspections (Bradsher, 2010c). While the delays and the underlying motives remain disputed, the perspective in the American press was clear: "if true, it is only the latest in a series of provocative measures" (Horn, 2010). Damien Ma[1] provided another perspective: "My concern is that there are many folks across interest groups who dearly want to believe that this "sanction" narrative is true, not so much to promote US industrial policy (which I think is a good idea), but to just punish China as the solution. That is the real risk to me of [this] narrative" (in Madrigal, 2010). Chinese academics like Yufan Hao and Jane Nakano have furthermore stressed that China would not use rare earths as a weapon and that the delay in rare earth shipments that caused international outcry had probably more to do with internal bureaucracy than anything else (in Webster, 2011).

Secondly, it is often argued that the export restrictions imposed by China, create and "unfair competitive advantage" (Buijs and Sievers, 2012) as local Chinese producers benefit from lower prices. Although price information is not readily available because REE contracts are generally negotiated rather than traded on spot or future markets, there is strong evidence that price differences between the Chinese market and the ROW are indeed significant (Table 3). The exact duration of such contracts is mostly kept quiet but a preference for 'long-term' seems to exist (e.g. Salzman, 2012; Swanepoel, 2011). Furthermore, since 2006, China has reduced exports by 6% annually. When China further reduced their export quota in the second half of 2010, despite heavy protests in the ROW, price spikes of up to 850% occurred in the market

[1] Damien Ma is a Fellow at The Paulson Institute, focused on investment and policy programs and the Institute's research and think tank activities. Previously, he was a lead analyst at Eurasia Group, a political risk research and advisory firm, specializing in China.

Table 3
Price increase for selected REE and the difference between China and ROW Lynas (Corporation, 2012).

2009–2011	Average price increase		Price increase difference
REE oxide (FOB price)	ROW	China	
Lanthanum oxide	2133.20%	531.37%	401.45%
Cerium oxide	2628.87%	919.25%	285.98%
Neodymium oxide	1225.94%	1132.59%	108.24%
Praseodymium oxide	1094.29%	919.16%	119.05%
Samarium oxide	3041.18%	578.05%	526.11%
Dysprosium oxide	1253.39%	1239.19%	101.15%
Europium oxide	576.75%	575.69%	100.18%
Terbium oxide	645.39%	629.66%	102.50%

(Humphries, 2012; Looney, 2011). More structurally, Lynas Corporation publishes the daily prices for specific rare earths, which shows that between 2009 and 2011, average prices have increased by factors of 5.7 to 12.4 in China and between 5.7 and 30.4 in the ROW. Although Chinese prices are indeed lower, it is interesting to see that the relative price increases for neodymium, praseodymium, dysprosium, europium and terbium oxides are almost identical for both China and the ROW, while the difference in relative price increase for samarium (5.26), cerium (2.86) and lanthanum (4.01) oxides are very pronounced (Lynas Corporation, 2012).

Thirdly, China's de facto monopoly position and the creation of price differences is often interpreted "as an attempt to capture more rents along the value chain" because companies that require REE inputs are forced to move their operations to China to "benefit from a steady and affordable supply of rare earths" (Buijs and Sievers, 2012). This outcome has been confirmed by the vice chairman of Inner Mongolia Zhao Shuanglian: "To use moderation in the control of the production of rare earth resources and reduce exports to an acceptable level is to attract more Chinese and foreign investors into the region" (Bradsher, 2010a). While this statement exposes a correlation between the Chinese policy and the attraction of investment, it leaves open the question whether this outcome is also the overarching goal of the existing policies; two things that are often confused in popular and policy debates.

These three arguments appear characteristic of resource nationalism and echo concerns about energy security following the Arab oil embargo in 1974 (e.g. Okita, 1974; Park et al., 1976). While there is considerable evidence that such embargoes generally hurt the country imposing the embargo through the enactment of counter-strategies (Buijs and Sievers, 2012), and that such self-imposed export constraints run counter to a purely economic logic, the ROW perspective seems to focus on arguments rooted in economic self-interest (price differences leading to competitive advantage and attracting FDI) and Chinese power plays. In a particularly critical article, Nobel prize winner Paul Krugman called China a "rogue economic superpower", and an unreliable regime "willing to wage economic warfare on the slightest provocation" (Krugman, 2010). But, there are two sides to every coin and in order to provide a full understanding of the REE debate, we turn our attention to China's perspective.

4. China's perspective

The Chinese perspective is not one of resource nationalism but one of domestic demand, environmental worries, social upheaval, illegal mining, smuggling, and abiding by international trade regulation (Hao and Liu, 2011). Following the Chinese 'Information Office of the State Council' (IOSC), this will entail increasing the industrial scale of rare earth processing, restructuring pricing

Table 4
China's REE policies.

China	Past situation	Actions and plans
Economic	1. Illegal mining and 47 licensed REE producers 2. Wasteful competition with negative externalities 3. Cheap prices for REEs	1. Close down and consolidate into 3 SOEs+New policies 2. Increase centralized control over pricing and incorporate externalities 3. Export taxes+Attract investment
Social	1. Human health 2. Social unrest 3. Organized crime 4. Meet own demand	1. Deal with pollution 2. Control, allow and enforce 3. Increase penalties 4. Ensure local supply (quota)
Environmental	1. Water Pollution 2. Farmland deterioration 3. Overexploitation of resources 4. Climate change	1. Cut (illegal) production 2. Cut (illegal) production 3. Cut Production and export quota 4. Reduce carbon intensity

ladders to more accurately reflect the cost of rare earths and working towards developing more REE-based end-products. At the same time China seeks to increase control of disorderly mineral exploitation, limit excessive mining and monitor and invest in cleaning up environmental damages (IOSC, 2012). The main REE policy initiative undertaken by China's premier Wen Jiabao is the commitment to consolidate the entire rare earth industry into three regional state-owned enterprises (SOEs). This would result in a division of the Chinese industry into three districts: North (Inner Mongolia and Shandong), South (Jiangxi, Guangdong, Fujian, Hunan, and Guangxi), and West (Sichuan).

The restructuring of the mining regions has multiple advantages; politically, it would facilitate decision-making and enforcement processes around production, control of export quotas, and pricing of rare earth oxides (Hurst, 2010). Environmentally, the consolidation exercise is meant to improve the sustainability of mining and refining. Socially, it would facilitate the acknowledgment of health-related problems caused by the abuse of toxic chemicals. Economically, the business rationale behind the consolidation is to attract investment, expand downstream services, increase tax income and avoid unnecessary competition – amongst other by illegal mining – and accompanying financial losses (Tse, 2011). These triple bottom line targets are heavily intertwined and consistent with China's general development strategy that includes reducing its carbon intensity, stimulating low carbon technologies, and increasing its GDP per unit of energy used (Hannon et al., 2011). More specifically, the IOSC has stated formally: "The state encourages enterprises to strengthen innovation in management, establish the modern enterprise system, and accelerate industrial upgrading, in order to transform them into modern enterprises that save resources, protect the environment, follow the path of intensive development and actively fulfill their social responsibilities" (2012). We discuss the economic, environmental and social rationales separately before we move on to expose the differences between the clashing perspectives explicitly. Table 4 summarizes China's triple bottom line (Elkington, 1997) and links the situation in the recent past to the actions the government is taking to overcome the existing problems.

4.1. *The economic rationale*

China's Ministry of Industry and Trade prohibited all new mining licenses until at least July 2011 and banned all new rare earth separation projects until at least 2015 (Tse, 2011; Vateva, 2012). Though such measures may seem draconic, eliminating illegal mining is fundamental to increasing control over prices and to decreasing environmental damage (Seaman, 2010; Vateva, 2012). Despite local governments focusing their resources on the crackdown, illegal mining persists and the Chinese government has not mapped out specific punishments to target illegal REE miners. Local law officials can only punish illegal miners on grounds of forest and natural resource damage, which currently stands as a $1.6 (10 Yuan) fine for every square meter of forest damaged (Xinhua, 2011).[2] The new policy framework however offers some progress as it allows rewards of up to 3,000 Yuan for informants. This increased the effectiveness of controls, resulting in the closures of 23 illegal mines and 57 processing ponds by April 2012 (Yoshioka, 2012). China's synchronised crackdown on illegal mining has been applied to a number of mining operations across the nation, not just rare earths, driven by the same desire to rid the countryside of unsafe and careless mining practices (Jingxi, 2012; Xinhua, 2012). In 2006, 47 domestic REE producers and traders were authorized to export REE products; by 2011, this number had decreased to 22 authorized REE producers following the implementation of China's "Rare-Earth Industry Development Plan of 2009–2015" (Hurst, 2010). Stopping illegal mining (and illegal exports) has clear economic implications. An unofficial government source stated that about 20,000 t of REEs were smuggled out of the country in 2008, which equates to roughly 50% of legal exports of 39,500 t that year (Xinhua, 2009). Japan is estimated to be one of the benefactors of this illegal trade, obtaining 20 per cent of its rare earth needs from the Chinese black market (Hurst, 2010).

By restricting the exports of rare earths and using a two-tier pricing structure, China is using a trade scheme that encourages manufacturers to move production to China. If production is moved to China, companies capitalize on the opportunity to sidestep the export quota system as the quota only refer to the exportation of raw materials: companies are exempt when exporting finished goods (Nasir, 2012). The ambition to attract companies from both home and abroad has been confirmed by Inner Mongolia's vice-chairman Zhao Shuanglian (in Dingding, 2009). While the ROW sees the desire to attract FDI as the dominant motive for the export taxes and quotas, it is valuable to understand China's rationale for these limitations to free trade. From China's vantage point, there is poor sagacity in importing end products fabricated from its own exported raw rare earths. The value of rare earths increases over 1000% from REE in its ore compared to its refined state as a metal, as shown in Fig. 4 (Sykes, 2012). A primary mechanism in overcoming the Dutch disease[3] is indeed to attract investors in the rare earth processing sector from around the

[2] Xinhua is China's official news agency.

[3] Economic term coined in 1977 in *The Economist* to describe the ostensible relationship between the increase of mineral or resource exploitation and the corresponding decline in manufacturing.

world (Bin, 2011). To date, $960 million has been invested from enterprises in the United States, Germany, France, Japan, and Canada into the rare earth industry, indicating the strategy has had the desired effect (IOSC, 2012).

4.2. The environmental rationale

According to Zhang Peichen[4] "China's rare earth output cannot be raised fast enough to meet the entire world's needs, as there are environmental factors to be taken into consideration with an increase in rare earth production" (in Bradsher, 2010a). Generally, the most significant environmental impact from REE mines is uncontrolled radioactive elements found in most ores from which REEs are extracted (e.g. Bell, 2012). It is estimated that one tonne of REE can produce 60,000 m^3 of waste gas that contains hydrofluoric acid, 200 m^3 of acid-containing sewage water, and 1–1.4 t of radioactive waste (Jiabao and Jie, 2009; Kanazawa and Kamitani, 2006; Paul and Campbell, 2011). Additionally, reagents, injected into the ground to extract the REEs from clay ions, contaminate water supplies, making it unsuitable for drinking or irrigation (Gao and Zhou, 2011). This water pollution caused by leakage of chemicals poses a serious threat to China's ecology as much of the mining in Baotou occurs adjacent to the Yellow River, the primary source of irrigation and fishing for 150 million downstream users (Hurst, 2010). Toxicity from chemicals used in processing facilities in China has also caused measureable amounts of disease, occupational poisoning, and farmland destruction in and around Baotou (Gao and Zhou, 2011). Beyond the clear environmental problems, the World Bank (2007) reported that the cost of environmental degradation in China would rise from 3 to 5% of national GDP in 2003 to 9% in 2012, a tremendous figure that provides strong support for environmental regulation in China. China has responded to these environmental challenges by cutting down on mining (93,800 t quota in 2011), and smelting, separation, and production (90,400 t), and by enforcing environmental legislation. These quotas, the economic downturn and the increased costs of environmental protection resulted in two-thirds of the rare earth producers being shut down or having to cut production drastically (Hongpo, 2012).

Although the environmental case is clear, the ROW has a strong incentive to downplay any environmental motivations China might utter. As stated by Alan Wolff[5] when talking about the rare earth WTO case: "A panel would sympathize with a genuine environmental objective…". But I do not think it would sympathize with cutting off supply disproportionately to foreign users in the name of saving the environment" (in Bradsher, 2010a). While the WTO case is still pending, it is important to remember that there is broad agreement that lax regulation on China's production is a key driver in China's ability to keep REEs' costs low (Seaman, 2010) and that Mountain Pass in California was closed due to environmental concerns and uncompetitive prices (Juetten, 2011).

4.3. The social rationale

China has clear social and health-related motives to curb REE exploitation. The high incidence of black lung or pneumoconiosis in Boatou, with 5387 residents suffering from the condition, is directly tied to the 8.5 kg of fluorine (a toxic gas) and 13 kg of dust that are generated per produced tonne of rare earth (Hurst, 2010). Occupational poisoning from lead, mercury, benzene, and phosphorous also plagues the region (Jiabao and Jie, 2009). These health and safety risks are influencing the relationship between Baotou and Beijing, which has never been one of solidarity and strength (Truscott, 2011). The health risks are exacerbated by the Baotou Steel Corporation, the 5th largest steel producer in China, which sees REEs as an economically irrelevant set of by-products due to their small market size ($3–4 billion) compared to the market size of their primary ore, iron, valued at $962 billion (Ernst & Young, 2011, 2012). As a result, a pool of 170 million tons of rare earth and other by-products lies dormant in standing water while villages downstream are forced to relocate as high traces of these elements appear in drinking water, found as far downstream as the Yellow River (Bin, 2011; IOSC, 2012). On a broader scale, there are estimated to be more than 450 'cancer villages' in China (Lee, 2010). Furthermore, since the 2007 World Bank's report stated that around 750,000 Chinese die every year due to coal-energy related pollution, the government has begun to realize that China's rapid industrialization and growth are "a serious obstacle to social and economic development" (Environmental minister Zhou Shengxian in Wade, 2011).

In their detailed analysis of social unrest in China, (Gobel and Ong, 2012) argue that the spectacular rise in social upheaval (180,000–230,000 public protests in 2010) is chiefly triggered by land disputes, environmental degradation and labor conflicts. For instance, in July 2012, rural workers protested against the mass amounts of environmental pollution in Sichuan, where heavy rare earths are mined, which lead to the ultimate cancellation of the proposed metal refinery plant in the city (Hook, 2012). Beyond this single example of increasing power of the local civil society, the spread of protests and riots is increasingly endangering the Communist party's ambition to balance social harmony with economic growth. The number of complaints to the environmental authority has increased 30% per year since 2002, while the number of mass protests over environmental issues has grown annually by 29% (Jun, 2007). Given rare earths' taxing toll on the public's health and environment and the riotous consequences, the government's consolidation and "cleaning up" of this sector to secure a broader success for their economic development strategy seems reasonable.

4.4. Comparing the perspectives

China's boardroom conversations regarding its rare earth strategy do not align with policy debates elsewhere. Whatever China contends in its *Situations and Policy on Rare Earths*, members of Congress in the US contend that China's export restraints are solely to benefit China's domestic downstream industry, to force the relocation of companies to China, and to exercise monopolistic power over elements that are critical to the ROW's defense and commercial industries (Morrison and Tang, 2012). These perspectives "may result from deeply engrained mistrust toward China" (Hao and Liu, 2011). Such mistrust could indeed explain why very little recognition is given in the policy debates to seemingly reasonable environmental and social concerns of the Communist Party. While the ROW's silence on these matters is informative in itself, our ambition is to delve into the dissonant arguments expressed by the protagonists. The ROW's focal argument seems to be that China disproportionally attracts foreign direct investment (FDI) to overcome resource dependence. Export quotas and price differences between domestic and international markets are perceived as proof that China abuses its natural resource advantage. Additionally, an old perception persists that China lacks innovative capacity and is merely a country of imitation (Naisbitt and Naisbitt, 2010). This innovation deficit is understood as an underlying driver of its desire to use export taxes as protectionist

[4] Zhang Peichen is the deputy director of the government-backed Baotou Research Institute of Rare Earths, the main REE research group for the Chinese industry.

[5] Former American trade official and current head of Dewey and Leboeuff international trade law.

measures. However, this argumentation is countered by China. As said by a spokesman of the Chinese Embassy in Washington, D.C., "I don't see any link between China's reasonable rare earth export control policy and the irrational U.S. decision of protectionist nature to investigate China's clean energy industries" (in Bradsher, 2010c). To analyze these claims we discuss the price evolution of rare earths, uncover China's innovation potential and seek explanations for the high prevalence of China-oriented FDI.

4.5. A history of prices

> *"In the beginning of the 1980s, we sold REE at the price of salt. But they deserve the price of gold. We are just starting to protect our natural interests".*
>
> (Wen Jiabao in Roland Berger, 2012)

A heated issue across parties is China's two-tiered pricing structure for rare earths. Domestic REE prices are below international prices, which the ROW argues is a crucial reason why China attracts foreign manufacturers. China, on the other hand, contends that this tiered pricing is not chiefly used to create price distortions or as a mechanism to draw in companies. Table 3 shows that the REE price increases between 2009 and 2011 had been less steep in China than in the ROW, which lends support to the ROW's case. Furthermore, various export duties are effectively imposed on rare earths leaving China,[6] so that price differences could indeed incentivize companies to relocate to China (Global Trade Alert, 2011). This is accentuated by the sharp decline in REE exports despite relatively stable production within China (Chan and Lan, 2011).

However, a historical argument sheds a somewhat different light on this matter. Prices for REEs declined from the late 1950s to the 1970s with an increased supply from Mountain Pass. Prices rose during the late 1970s due to inflation, rising energy costs, and increased demand and stabilised in the 1980s (BGS, 2011; Hedrick, 1997). When Chinese mines came into full force in the 1990s, supply quickly outstripped demand, driving prices down significantly. The growing demand for neodymium–iron–boron (NdFeB) magnets in the 2000s led to higher REE production in China. Overproduction of all REEs resulted, because specific REEs cannot be mined individually. This hitchhiker characteristic of some natural resources explains why supply and demand do not reach a simple equilibrium and challenge the notion of linear supply curves with responsive elasticities (Ayres and Talens-Peiro, forthcoming). Following the 2008 global recession, prices dropped and industries looked towards their existing inventories to decrease production costs. Prices for elements such as terbium fell by 50% from $720 per kilogram in 2008 to $360 per kilogram by 2009 (Bradsher, 2011b; Metal Pages, 2012). Prices increased in 2010 and 2011 driven by increased Japanese permanent magnet demand for hybrid EVs, by the cut in Chinese exports (Humphries, 2012; Looney, 2011; Watts, 2011) and because political and resource-specific barriers have made re-entering the market very difficult (Korinek and Kim, 2010). By the end of 2011, price volatility returned as the Chinese government imposed stricter regulations in the southern provinces, slowing down heavy REE supply (Metal Pages, 2012) (see Fig. 5).

Moreover, there is a clear economic case for price discrimination between the ROW and China. Following Aidt (1998), the internalization of externalities combines the Coasian rationale in which various parties mobilize to advance their interests, with the

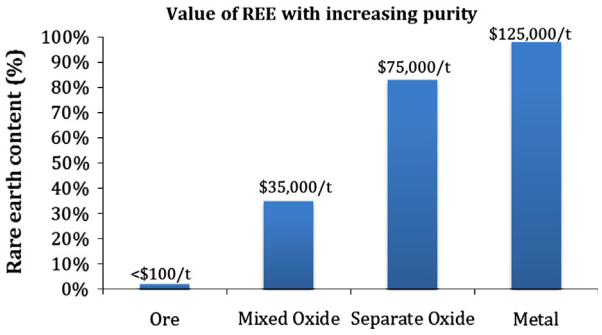

Fig. 4. REE value and purity (Sykes, 2012).

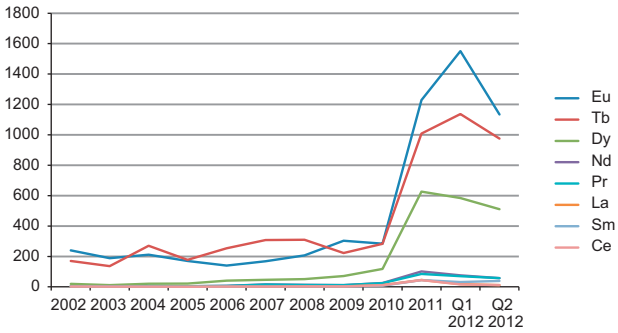

Fig. 5. REE real prices (Federal Reserve, 2012; Lynas Corporation, 2012; Metal Pages, 2012). The most likely candidate is the Innovation Metal Corporation's two North American separation plants which are still in the nascent feasibility stages (Wong, 2012).

Pigouvian tradition of a self-interested policymaker whose coercive power enables him to enforce environmental legislation and taxation. The need for government interference is transparent in the market failure, which leads to a gap between the private and the social/ecological optimum level of production (Lankoski and Ollikainen, 2003). Effective policy then ensures that the marginal abatement costs to offset the environmental damage equal the marginal external costs (Pindyck and Rubinfeld, 2009). From China's perspective, we have shown that externalities consist of local pollution that threatens the health of its people and other environmental damage. Given that China bears the (sustainability) costs of its REE production, it does not seem unreasonable to expect REE importers to pay a surplus economic charge. Such an argument has been advocated by Kox (1991) in his call for commodity agreements with third world commodity producers that include a price mark-up, in the form of an income tax, for environmental preservation. As argued in the famous Brundtland report, although developed countries have generally been successful in internalizing the costs of environmental damage in the export prices, "in the case of exports from developing countries, such costs continue to be borne entirely domestically, largely in the form of damage costs to human health, property, and ecosystems" (Brundtland and WCED, 1987). If the polluter is expected to pay, should not the importer of polluting goods pay as well?

4.6. Innovation potential

ROW governments and companies often argue that China has very little innovation capacity due to its controlling, centralized government. Additionally, China is increasingly being accused of violating intellectual property (IP) rights. US Treasury Secretary Timothy Geithner stated that China is "very, very aggressive, in stealing US technology", thereby voicing a common sentiment

[6] China designated a 25% export tariff on the following REEs: neodymium, yttrium, europium, dysprosium, terbium, and scandium. The remaining 11 rare earth elements face an export tariff of 15% and specific alloys, such as neodymium and dysprosium alloys, face 20% tariffs.

amongst US officials and executives (Younglai and Martine, 2011). Some contend that China's patent quota is driving China to steal IP in order to produce the required patent quantities with little regard for quality (Looney, 2011). Consequentially, China is labeled a nation with lackluster innovation capacity that can only regurgitate cheap and low-quality versions of goods.

While this might be true for some industries, the rare earth industry is not one of them. China controls 97 per cent of operations and has been improving its innovation capacity for each step in the REE production process since the 1980s. As a result, China has developed a world-leading REE knowledge base. Given that there is significant proof that network structures of organizations—such as those within the SOEs—foster learning, provide economic benefits, and facilitate the management of resource dependencies (Podolny and Page, 1998), REE knowledge networks can be expected to have a magnetic effect on companies. China's dominance is exemplified in the fact that even new mines coming online in the ROW will need to send their raw rare earths to China to be separated until a separation facility is developed elsewhere.[7] The cost of current separation facilities outside of China is approximately $800 million, which boils down to a separation cost of $40,000 per tonne per annum of throughput, excluding costs of labor and of required acids (Worstall, 2012). The key to the economic feasibility for new mines attempting to come online in the next 5–10 years will be to achieve low-cost separation techniques, which China has been perfecting since it took control of the REE mining sector in the late 1980s.

In 1990, rare earths received roughly 18,000 hits within the American Chemical Society database. That number jumped to 1 million in 2007, indicative of the growing interest in the field (Adachi et al., 2010). The importance of rare earths research has been increasing over the last few decades, with the foundation of "The Journal of Rare Earths" in 2006 by the Chinese Society of Rare Earth (CSRE) as an important step forward (CSRE, 2012). An analysis of research into rare earths by country sheds light on who holds the primary knowledge base, and hence the upper hand, in the best mining and manufacturing practices in rare earths. Thanks to China's increased investments in research funding as well as the opening of various state laboratories, the quantity and quality of China's research has dramatically increased (Hurst, 2010). Specifically, China has conducted more research and published more papers on separation—the most costly part of rare earth mining and processing—than Japan and the USA together (Adachi et al., 2010). China has also conducted significant research on REE-related pollution. China lacks, however, in research articles on innovative new processes for rare earth extraction where Japan leads (Adachi et al., 2010). Regardless, China currently stands at the epicenter of research knowledge in the sphere. The 'Journal of Rare Earths' contains a special column "bibliography of science and technology of rare earths published in China" (CSRE, 2012), emblematic of the dominance of Chinese knowledge concerning these metals. Beyond publications, China developed a dominant position (28% market share) in the global wind turbine market and the fabrication of NdFeB permanent magnets, as shown in Fig. 6 (GWEC, 2011; Hoenderdal, 2011; Mackowski, 2012). Therefore, China's incentive to draw in foreign knowledge for REE development in the wind sector is low. China already manufactures 75–80 per cent of NdFeB magnets used in the world (Chan and Lan, 2011). Moreover, in spite of easy access to neodymium and dysprosium needed for direct drive magnets used in wind turbines, Chinese wind turbine manufacturers are leading exploration into rare earth free designs via electrically excited permanent generators (Patton, 2011). Additionally, the country has previously proven its ability to innovate in low-carbon wind technology (Lewis, 2007).

When it comes to rare earths, there is thus considerable evidence that suggests that China does possess significant innovative capacity. Hence, companies might be drawn to China not merely because of easy access to natural resources but also because of easy access to essential knowledge.

4.7. Foreign Direct Investment (FDI)

Various US and Japanese companies are extending their factory capacity in China rather than elsewhere, explicitly motivated by easy access to specific REEs, and do so despite worries about trade secret theft (Bradsher, 2011a). Access to resources is thus a driver for corporate relocation, but there is more to the story. Despite government officials identifying new energy vehicles as one of seven strategic emerging industries that together should contribute to 15% of GDP by 2020 (Lindsay, 2012), China's innovation capacity in hybrid EVs and NiMH batteries has been relatively weak. ROW companies like General Motors, Honda, Ford, Saturn, and Toyota are still leading in this field, which is a strong driver for investments in lithium-ion technologies that require little or no REEs (e.g. Currie, 2012). Nonetheless, companies are still relocating to China. Although China holds the world's largest automobile market with 14 million sales in 2009 and is ramping up its production capacity (36.1% growth between 2009 and 2010), car ownership per capita is still significantly lower than in developed nations at 4.78% versus 40% (APCO, 2010), and the uptake for EVs in China has not yet matured due to elevated costs, lack of charging infrastructure and scarcity of car models (Arenas Guerrero et al., 2010; Krieger et al., 2012). The potential size of the market, the government's support, the strong local supply chain, the knowledge embedded in SOEs, and the permission to run 'trial and error' tests in the marketplace for EVs attracts companies such as General Motors to form joint ventures with Chinese firms (APCO, 2010; Krieger et al., 2012; Orr and Roth, 2012). Thus, while it is clear that China attracts much FDI, the reasons for this go beyond stable and affordable REE access. An interesting question becomes why these rational and economic corporate choices become so politicized. Californian Silicon Valley is outcompeting Boston-based Route 128 because of its sustained technological dynamism (Saxenian, 1991, 1996). The region has consistently maintained a leading edge in information and communication technology (ICT) through its ability to foster groundbreaking entrepreneurial ventures, often tied to the human capital embedded in Stanford University (Lee et al., 2000). The important role of academic research and entrepreneurial activity in the creation of innovative regions has been found in other regions as well (Etzkowitz and Klofsten, 2005). There is very little opposition to the magnetic effect of human capital, tied to regions such as Silicon Valley. While similar human capital and knowledge regarding REEs exists in China, the political perspective held by the ROW seems to be one reminiscent of resource nationalism. This belief is exemplified in former presidential candidate Mitt Romney's comparison between the REE crisis and the oil crisis (Weslosky, 2012). However, while Saudi Arabia's oil embargo in the early 70s is indeed the prototypical case of resource nationalism, it differs substantially from the Chinese example. Saudi Arabia was militaristically completely dependent on the USA, lacked the technology to extract, process and exploit its natural resource base, and did not have an appealing market (Bruno, 2012). China's evolution into a manufacturing powerhouse has

[7] Prices in this figure are real prices, corrected with the Producer Price Index for Crude Materials for future processing. Monthly data were obtained from the Federal Reserve, 2012. Producer Price Index: Crude Materials for further processing, in: Data, F.R.E. (Ed.). Federal Bank of Saint Louis, St Louis. and averaged on a yearly (quarterly) basis for 2002–2011 (2012). The base year was put at 2002, adapted from the original data with base year 1982.

been going on for various decades, as exemplified by Fig. 7 (data taken from WITS, 2010). China's exports clearly evolved from largely primary products and chemicals to manufactured goods. Specifically focusing on rare earths, China's domestic 'consumption' of these resources exceeds the consumption of the entire ROW (Kingsnorth, 2011).

We have brought forward dissonant perspectives regarding China's actions on the rare earth front. The ROW's arguments echo resource nationalism, forget the importance of China's knowledge networks, and omit China's growing market and its supportive internal governmental policies. Moreover, the ROW is notably quiet about the environmental and social motivations of cutting production and exports and differentiating between domestic and international prices. We have found many of these arguments to be unfounded. In the introduction, we hypothesized that China's policies could be interpreted as strategies of a socially responsible organization. How then should the ROW reframe its perspective to better shape, stabilize and bridge the REE space?

5. Discussion: the REE debate through a stakeholder lens

We discussed the perspectives of China and the ROW with regards to China's REE policies and have brought forward their explicit differences. In this discussion section, we reframe the debate through contrasting stakeholder lenses and characterize the importance of China's different stakeholders along the dimensions of power, legitimacy and urgency (Mitchell et al., 1997). While this framework is typically used for the analysis of corporations and is connected with the literature on corporate social responsibility (CSR) (Carroll, 1991; Elkington, 1997; Freeman, 1984), we believe it can be meaningfully applied to "China Inc." for four reasons. Firstly, we believe the strong hierarchical government structure, the absence of democratic voting, the ease of transferring ownership rights from one to another entity, and the professional management of resources, are more indicative of a typical corporation than of a typical (Western) government. Secondly, we are not the first ones to compare the elements of China to a corporation. Naisbitt and Naisbitt (2010) for instance associate Deng Xiaoping's role during the Cultural Revolution with that of a CEO's role in turning around a "rundown enterprise into a healthy, profitable, sustainable company". Thirdly, because the duties of the state befall on China Inc. as well, the 'corporation' is meant to behave socially responsible, so it makes sense to use a CSR-related framework. Finally, and most importantly, we are convinced that conceptualizing the debate along the three focal dimensions of power, legitimacy and urgency has the potential to challenge dominant Western perspectives and steer the debate towards a more constructive engagement with China. We look at the ROW as *external stakeholder* of China Inc., and three *internal stakeholders*: (1) Beijing as the central government or the 'board of directors'; (2) local authorities in REE rich regions that govern the mining process or the 'regional managers' and (3) the people in the affected regions or the 'local community/civil society'. While understanding the ROW as a single stakeholder with unified interests is clearly a simplification as many different countries face specific issues, our focus here is on the commonalities faced by the ROW. Table 5 presents an overview of the focal stakeholders of China Inc.

Power and dependence in the stakeholder theory relate to the (in)ability to affect or be affected by the achievement of another organization's objectives (Freeman, 1984). In the REE context, it is clear that *the ROW* is affected by China Inc.'s social, environmental and economic objectives. Power is typically wielded by those who control resources (Pfeffer, 1981; Pfeffer and Salancik, 1978) but only those organizations who know how to manage the resources they control, can turn these resources into a real competitive advantage (Sirmon et al., 2007; Sirmon et al., 2011). As argued before in the context of Saudi Arabia's oil embargo, without the ability to extract the focal resources, the advantage an organization (or country) can obtain is limited. In the context of rare earths this ability to process REEs almost exclusively belongs to China Inc. As such, it is clear that the ROW at the moment has very limited power. It has no control over resources, nor does it have the technological ability to 'produce' them, which was explicitly recognized by the USGS at the closure of Mountain Pass (Haxel et al., 2002). *The local Chinese governments* in the REE regions on the contrary have very high power. Their proximity to the resource and their status as enforcers of policy enables them to exercise control. Additionally, they possess the innovative ability to actually transform the ores into valuable resources. *Beijing's* power stems from its ability to shape and form policy and from its status as an 'enforcer of the enforcers' in that it has the power to exert control over local governments (Gobel and Ong, 2012). Additionally, the long term investments in REE knowledge epitomized by the opening of two state laboratories for advancements in rare earth production and extraction methods in the 1990s prove that a great amount of knowledge is centrally controlled (Hurst, 2010). Moreover, Prime Minister Wen Jiabao, a geologist who studied REEs at graduate school, has said himself that little happens on REE policy without his explicit involvement (Bradsher, 2011a). It is therefore safe to say that a relationship of mutual dependence exists between local and central governments (Mitchell et al., 1997). Research into organizations has shown that such relationships are drivers of mergers and other means of constraint absorption (Casciaro and Piskorski, 2005), a tendency found in China Inc. as well, as exemplified by the foundation of three overarching State-Owned Enterprises. Finally, the *local community* is not yet a powerful actor but is becoming empowered. Changes in Chinese repressive policies, together with increasing wealth and better connectedness to the outside world and to each other thanks to revolutions in ICT have created a more powerful civil society (Gobel and Ong, 2012). This power is exemplified by the occasional success story of how public protests lead to policy changes, such as in Qiugang, where a small village triumphed and shut down multiple chemical factories that had been polluting their water sources (Gobel and Ong, 2012). It is important to realize the implications of this assessment, as we have suggested that in the

Table 5
Power, legitimacy and urgency of China Inc.'s stakeholders.

Stakeholders—attributes	ROW	Local governments	Beijing	Local community
Power	No REE control—Lack of production capacity	Proximity and control—Local enforcement—Innovative Capacity	Policy shaping—National enforcement of local authorities—Knowledge	ICT—Growing wealth—Shifts in policy
Legitimacy	Resource preservation—Polluter pays—WTO infringements	Implied in official status—Locally affected (harm)—Risk-bearing (jobs)	Implied in official status—Not challenged by civil society—Non-democratic?	Locally affected—Cancer villages, black lung
Urgency	High-tech and clean tech—Shape public opinion—Large size	Environmental and social issues—Social unrest	International and National pressure—LT planning	ICT—Success stories—Critical to health

relationships between China Inc. and its four focal stakeholders, the ROW is the least powerful. This is obviously not an assessment of the absolute power of the ROW but merely of relationship-specific strength. By moving 'outside the box', the ROW can increase its power, as we will discuss in the following section.

Legitimacy in a stakeholder context is construed as a legal or a moral right, often embedded in a contract (Carroll, 1991). Additionally, legitimacy can be obtained by those who are risk-bearing or who are harmed by the actions of the focal organization (Mitchell et al., 1997). When it comes to contracts, *the ROW* clearly does not have a legitimate claim against China Inc., because no contract exists that requires a country to export its resources. At best, there are agreed upon principals of free trade, embedded in the WTO, which could be understood as 'moral contracts'. This free trade argument is often made against the export quotas and the two-tiered pricing structure. While the former could bear some support from a legitimacy perspective, the price difference argument can at least partially be countered by the incorporation of externalities caused by the production of REEs (Kox, 1991). Moreover, the internal price increases for dysprosium and neodymium, two of the most demanded REEs, have followed the price changes abroad (see Fig. 3) and overall, the rare earth price increases between 2000 and 2010 remain below those of gold, copper and iron ore (IOSC, 2012). Furthermore, one can question the legitimacy of many ROW countries themselves when it comes to abiding by free trade rules. Currently, the USA has 17 running disputes with the EU, while the EU has sued the USA 32 times (Zaring, 2012). Extensive research exists on the influence of European "Common Agricultural Policy" and export subsidies more generally on developing nations (e.g. Diao et al., 2001; Elbehri and Leetmaa, 2001; Herzfeld, 2005). Besides the legal arguments against the legitimacy of the ROW (with perhaps the notable exception of Japan that is less often a respondent of WTO claims (Moris, 2011)), there is an important fairness argument. Given that the ROW closed (most of) its mines and thus outsourced the mining, and the accompanying pollution and social ills to China Inc. (BGS, 2011), it can hardly claim any legitimate right to the fruits of that labor. On the other hand, the *local governments and Beijing* share a legitimate official status and legal recognition as functionaries of China Inc. Additionally, from a risk- or harm-based perspective, both local governments and *communities* are facing severe health risks, as shown in examples given previously concerning cancer villages, black lung and poisoned water (Gobel and Ong, 2012; Hurst, 2010; Jiabao and Jie, 2009; Lee, 2010). Importantly, the Communist Party's self-conception is changing and ideological control is making way for rules and laws inspired on international standards (Naisbitt and Naisbitt, 2010). This evolution might partially explain why—despite the questionable democratic nature of the Beijing government—the increasing protests by the civil society are generally not directed at the central government and thus not a threat to its legitimacy (Gobel and Ong, 2012). This perhaps reflects the Chinese belief in performance legitimacy: "If the government governs well, it is perceived as legitimate" (Zhang Wei-Wei in Naisbitt and Naisbitt, 2010). In general, local governments face more personal risk than the central government as they are more commonly blamed for and fired over not meeting targets imposed by Beijing (Gobel and Ong, 2012). Fig. 5

Urgency is understood as time sensitivity and criticality to the focal stakeholder (Mitchell et al., 1997). Moreover, it is reinforced by the attention-getting capacity of the claimant. The attention-based view has advocated that the limited processing capacity and bounded rationality of the top management, in combination with imperfect procedures and communication channels, limit managers' ability to pay attention to all possible issues (Ocasio, 1997). This limited attention determines which issues are perceived and how they are interpreted (Daft and Weick, 1984), which in turn drives the occurrence of organizational moves that shape the environment (Ocasio, 1997). Within this framework, *the ROW* clearly has high

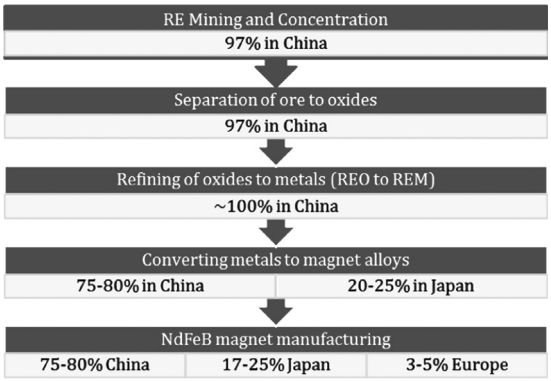

Fig. 6. China's dominant position in the REE production process.

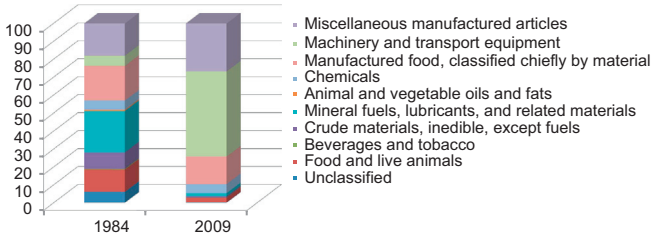

Fig. 7. China's shifting exports: 1984–2009.

urgency. Firstly, there is the notion of size. Given that the ROW is an incredibly large external stakeholder; its demands have a size-driven urgency. This is directly mediated by the ROW's capacity to shape the public opinion, at least within its boundaries, and frame the debate. The conflicting perspectives described in this paper serve as anecdotal evidence. Furthermore, many organizations are directly dependent on specific REEs that are defined as critical (COM, 2008) and this dependence is time-sensitive in that production targets and market demand require a timely response. The urgency of the *civil society* is, similar to their legitimacy, largely based on the threat they face from the environmental degradation, but constrained by their limited voice. This time-sensitive and critical issue is one of the key drivers of social unrest, which directly affects the urgency of the *local governments* that need to maintain social harmony. While the environment as a stakeholder in its own right has been supported from a fairness or ethical perspective (Orts and Strudler, 2002; Phillips and Reichart, 2000), it is clear from Beijing's perspective and actions that over-exploitation of resources in combination with the risks this imposes on the triple bottom line are key policy drivers (China Daily, 2012; IOSC, 2012). Finally, the *central government* faces very high urgency as well. As the focal opponent of the ROW, it has to balance the demands from an increasingly urgent stakeholder with the goals of its own economic and social welfare, its growth ambition and the constraints imposed by the urgent needs of the civil society and the limited carrying capacity of the local ecosystems.

Our conceptualization of the four focal stakeholders of China Inc. along the dimensions of power, legitimacy and urgency has shown that Beijing is a definitive stakeholder of China Inc. It scores high on the three focal attributes, which is probably not surprising as the central government is the key decision maker. Besides, the local governments should be seen as dominant stakeholders as they have high power and high legitimacy (moreover both are intrinsically intertwined with the central government) but somewhat lower urgency, especially when likened to the local communities who have high urgency and high legitimacy but still relatively low power. In the framework of Mitchell et al. (1997), local communities are dependent stakeholders who should try to link up with more

powerful actors to increase their salience. The ROW manifests itself as a demanding stakeholder, one with high urgency, but limited power and legitimacy. Mitchell et al. (1997) describe such stakeholders as “mosquitoes buzzing in the ears of managers: irksome but not dangerous”. While this outcome is undoubtedly too strong a statement, it entails a valuable insight. From a stakeholder perspective, China Inc.'s strategies are justifiable as they primarily meet the demands of stakeholders with higher salience.

6. Changing the stakeholder dynamics in the ROW

The insight that the ROW has low legitimacy and low power with regards to rare earths provides useful policy clues. In order to gain greater salience vis-a-vis China Inc., the ROW needs to increase its power and its legitimacy. Given that the low legitimacy is based on the absence of formal contracts, the outsourced environmental damage and the inconsistent argumentation around free trade, the ROW could tackle any of these issues. The most promising avenues seem to be increasing the alternative supply through the opening of mines in the ROW and developing clean processing techniques. Both are probably rather long term objectives as the opening of mines and the development of these novel techniques are time-consuming processes (Chan and Lan, 2011; Kidela Capital Group, 2010). Firstly, the legal hoops to jump through, the required environmental assessments and the needed infrastructure often take many years to complete. The Australian Mount Weld for instance still lacks the necessary infrastructure and permits to begin mining, separation, and transportation (Morrison and Tang, 2012). Nonetheless, increasing supply through streamlined yet stringent legal channels and accepting a part of the environmental burden that comes with such investments is fundamental to increasing legitimacy. Secondly, the development of new techniques is to a certain extent predicated on the ability to pilot them in actual contexts. Given that China Inc. made the development of rare earth resources a top priority since the 1980s, their 30 year head start will not easily be overcome (Morrison and Tang, 2012). However, the main players within the ROW, especially the USA, Japan and the EU still have a joint innovative output per capita (as measured by patent applications) that strongly exceeds the Chinese total (Khan et al., 2011). There is no real reason to assume they could not turn this innovative ability towards rare earth processing techniques.

From the power perspective, we have argued that the ROW is weak due to its lack of control over any resources and due to its lack of knowledge and capabilities needed to exploit REEs. As said before, even if mines outside China would be operational, the refining from rare earth oxides to metals would have to be done by China Inc. Improving technological capabilities will thus strengthen the power within the dyad, as well as increase legitimacy. The more direct approach that could shift the power dynamics lies within the stakeholder framework and in the resource dependence theory. Power is understood as a characteristic of the specific relationship between the focal actors (Emerson, 1962). Given that in the short term, power within the dyad can hardly be shifted, strategies and policies that move outside the dyad carry significant potential. Although most research on the resource dependence theory (RDT) has been limited to the solutions defined by Pfeffer and Salancik (1978) which chiefly consist of alternatives within the dependent relationship (Hillman et al., 2009), the options to seek advantage beyond the troubled relationship and beyond the typical RDT solutions have been suggested elsewhere (Schillebeeckx and George, forthcoming). However, even beyond the dyad, one cannot deny that the overarching trade deficit most countries, especially the USA, have with China, adds to their power-deficiency. As argued by Fishman (2005), the economic clout a country holds over China, diminishes the more China is able to clone vital parts of that country's economy. One of the most promising avenues to balance the ROW's relative power deficit is through technology exchange or countertrade. Germany and Kazakhstan for instance made a deal to exchange the right to search and mine rare earths in Kazakhstan for technological investments worth nearly $4 billion (Eddy, 2012). This is not an isolated event. Japan exchanged nuclear technology with Vietnam, India and Kazakhstan to get access to mineable rare earth resources, while South Korea is forging similar agreements with other resource-rich nations (Ernst & Young, 2011; Hirokawa, 2011; Miyazaki, 2012). These technology exchanges can be understood as countertrade arrangements in which the resource owner offers access to resources and imposes reciprocal commitments (Hennart, 1989, 1990). The commitments typically occur in the form of intertemporal buy-back where the technology owner provides the necessary resources to construct the plant and is paid from the output once the plant is operational. As is the case for REEs, the quality of output is generally difficult to judge ex ante and the costs of foreign ownership are high (Mirus and Yeung, 1986). Choi et al. (1999) argue that such arrangements are rational when measurement and enforcement costs are uncertain and both parties have distinct and uncertain identities, which occurs frequently when dealing with emerging economies. The fact that such countertrade imposes the risk that the focal country clones the technological knowledge, perhaps explains why we see it more with developing countries and less with China Inc. as a partner.

A third option for the ROW is to decrease its urgency. Once more, increasing supply is a way of doing this, as is increasing investments in substitution, resource-efficiency and recycling. In some cases direct substitution seems to be impossible as is the case for europium in liquid crystal displays. Sometimes substitution decreases product efficiency and is therefore not economical and more often than not the best substitute is another REE (Haxel et al., 2002; Lusty and Walters, 2010). In rare events, substitution can lead to savings thereby improving competitiveness (Currie, 2012) but this is generally predicated on a novel technology and design, rather than a straightforward substitution. A risk here is that regional resource constraints might imbue conflicting or competing technological trajectories in which valuable human and natural resources are wasted (Schillebeeckx and George, forthcoming). While recycling technology is likely to improve in the future, relatively little attention has been paid so far to the concept of urban mining rare earth metals due to the technological difficulty of breaking down very stable compounds, the often small quantities used in products, and the second law of thermodynamics (Lusty and Walters, 2010; UNEP, 2011). Honda has made progress in “the first mass-production rare earth recycling process” (Currie, 2012), and progress on alternative materials for permanent magnets is being made (e.g. Bourzac, 2011), but more needs to be done to balance the dynamics in the REE space again.

7. Conclusion

This article has provided an overview of the different perspectives China and the rest of the world hold when it comes to the former's rare earth policies. While the ROW seems to perceive China as a resource nationalist that imposes output quota and exploits price differences between domestic and international market to attract foreign direct investments—needed to overcome its lack of innovative capacity—in its REE regions, the Chinese discourse seems to differ radically. China's 12th Five Year Plan signaled the intention to “shift from a policy of maximizing growth to balancing growth with social harmony and environmental sustainability” (Hannon et al., 2011), an active acknowledgment of its triple bottom line obligations to its various stakeholders. We find that the ROW largely ignores the

importance of the social and environmental issues and that the persistent perspectives about China Inc.'s lack of innovative capacity are at least partially incorrect when it comes to REEs. Moreover, China's growing internal demand, its supportive internal policy environment and its trial and error market as well as its knowledge networks around REE are other essential drivers for corporate FDI. In the context of social unrest, it has been argued that the EU (and other governments) need "to devote more resources to studying the interactions between China's domestic policy and foreign policy" (Gobel and Ong, 2012, 17). We believe this statement has broader application than merely with regards to public protests. The interplay and power plays between the central authorities and the local governments regarding multiple industries and the rare earth industry in particular seem to be poorly understood. However, for policy formation and reactions to decisions of China Inc.'s strategies, it is important to recognize these in order to avoid a straw man perspective in which China is depicted as the bogeyman. As argued by Fishman "[t]he rest of the world will profit little by demonizing the Chinese, but might find powerful answers in studying and admiring, even grudgingly, the country's growing strengths" (2005). We suggested that the opening of new mines will serve a triple goal through diminishing urgency, raising power and raising legitimacy. Moreover, we argued in favor of countertrade, either with other nations or directly with China Inc. to ease short-term constraints. Importantly, the ROW needs to recognize China's genuine environmental and social concerns that rose as a consequence of overexploitation of natural resources and public protests. It should not be hard for a Western government to understand the importance of social harmony within their own boundaries. So why would it be any different for the Communist Party?

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