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Inside Oligarchs versus Outside India: Technical (non)progress and environmental effects in Post-Soviet Steel

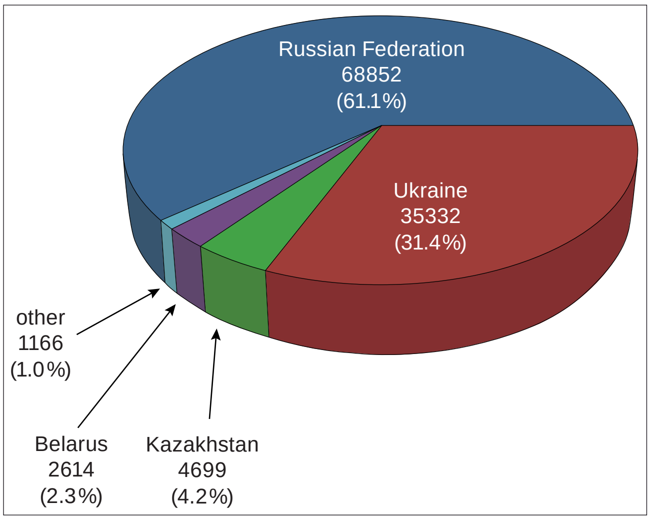
Manuela Troschke and Florian Wittmann

The recent case of the Ilva Steelworks in Italy demonstrates that outdated technology in steel production can persist and respective environmental damage can occur if economic and political interests that stick to an overcome developmental model collude. Steel played also a prominent role for economic development of the Soviet Union, but over decades under the plan mechanism a pronounced technological backwardness of the sector evolved. Despite privatization, trade liberalization and rising prices for input goods since transition, backwardness persists till now and environmental damage caused by the sector is a serious concern. Our article examines technical (non)progress in the steel sector of Russia, Ukraine and Kazakhstan and looks at the explanatory factors for backwardness, with a special focus on ownership. To overcome the locked-in situation, we propose that EU anti-dumping investigations and trade agreements should take into account a broader range of potential subsidies and include environmental factors alike.

The role of Steel in CIS countries

Steel production had been a main driver of economic development and industrialization in the Soviet Union. It contributed substantially to "overtaking the west" and fuelled societal change towards a post-feudal industrial society. Among CIS states, the three largest producers of (crude) steel are Kazakhstan, Ukraine and Russia, while Russia and Ukraine are ranked among the ten largest steel-producing countries in 2012. Soviet steel enterprises dominated the economic (and partly also the political) development of these countries. Historically they constituted the industrial base of a country, provided basic input goods for many other sectors, with the defence industry playing a prominent role. Steel production till nowadays is a backbone of the three economies. Despite a certain decline within the last decade, the share of steel in industrial production accounted for 12% (Russia), 14% (Kazakhstan) and 19% (Ukraine) according to official statistics in 2011. Steel exports of the oil and gas exporting nations in the same year contributed 5% (Russia) and 7% (Kazakhstan) but 27% for Ukraine to total exports.

Figure 1: Producers of crude steel among CIS countries in thsd. tons (2011)



Source: Steel Statistical Yearbook 2012

Steel plants all over the world are predominantly large – the 15 largest producers account for one third of world steel production. Also in CIS, the steel market is dominated by large enterprises. After the collapse of communism, they all had been privatized (and partly even re-privatized) in the early years of transition. The Russian market is concentrated on six large enterprises which produce 86% of the countries crude steel. In Ukraine seven companies contribute 88% to steel production, while the market in Kazakhstan is dominated by the Temirtau steel plant that provides 80% of national production capacities. The interplay of strategic economic importance of the sector and high market concentration, plus weak democratic control structures, result in a high potential for rent-seeking and rent extraction in that sector. Steel plant ownership matters.

Figure 2: Main steel producing companies in the CIS countries

Country	Company	Foreign Investor	Market share	Revenues (2009; in mln €)
Kazakhstan	ArcelorMittal	yes (India)	80%	42546,2
Russian Fedaration	Evraz	no	18%	6813,4
	MMK	no	17%	3542,7
	Severstal	no	17%	8937,9
	NLMK	no	16%	4271,0
	Mechel	no	9%	4011,9
	Metalloinvest	no	9%	3277,0
Ukraine	ArcelorMittal	yes (India)	15,5%	1324,6
	Metinvest	no	37,9%	3236,5
	Industrial Union Donbass	no	20,9%	1789,8
	Donezkstal	no	10,4%	890,6
	Zaporizhstal	yes (Russia)	9,6%	824,6
	Privat-Gruppe/ East-One	no	5,6%	480,7

Source: Own calculations based on: Fortescue 2011; Roland Berger 2012; annual financial reports of companies; for Kazakhstan and Russia only informations about total revenues of the companies are avaliable.

Incentives for technological change in transition – the textbook case

Steel production is not only merits for a country; it also causes dependency from input goods that are not available in every producing country – especially iron ore and primary energy carriers like high-quality coking coal and natural gas. In Ukraine, that has own coal deposits but depends on gas import from Russia, in recent years the iron and steel sector accounted for 20% of total final energy consumption. Also, steel production is a process that – depending on technologies used – can be extremely harmful for the environment and the health of the surrounding population. Thus the efficient use of inputs, control over emissions and hence technological progress in steel production was and is a concern not only of plant owners but also of governments world-wide.

In transition countries, early stage hopes rested on privatization. A private owner per se was expected to upgrade the enterprise and to make it profitable as he was thought to be the "better entrepreneur". Foreign investment should play a decisive role, since a foreign investor would be capable to introduce new technology together with the respective know-how. Pressure to upgrade technology would also come from trade liberalization – enterprises exposed to international competition would be forced to keep up technologically. Price liberalization and resulting increased prices of formerly subsidized inputs like energy would evoke efforts to diminish these costs by taking measures to replace production technology or to improve energy efficiency within existing production routes as it is the case in Europe (Flues / Rübbelke / Vögele, 2014). Environmental regulation can also be instrumented to promote technological change and technology adoption from abroad. However, under weak regulation and poor enforcement of rules, there will be no effect on technological progress; over time backwardness might even increase if foreign investors invest into the countries as in pollution havens.

Incentives and Disincentives for technological change in Post-Soviet Steel

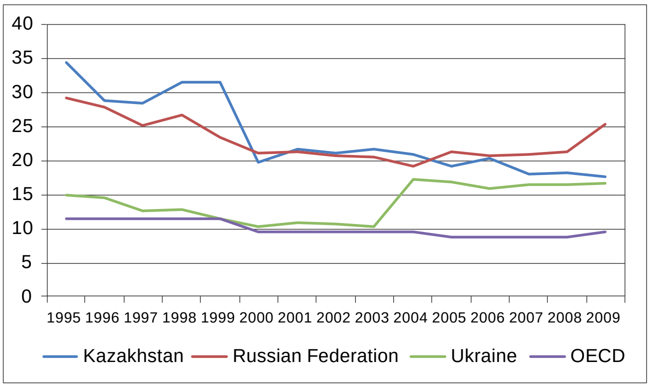
Incentives for upgrading technology have indeed been high from the beginning of transition and intensified over years. All steelworks in CIS countries under consideration have been fully privatized in the early years of transition; in most cases, they became vertically integrated into private holding companies. Supply chains that had existed in Soviet times disrupted, and enterprises had to import parts of their supplies from now foreign countries. Prices for many input goods saw price hikes, partly because they had to be imported now and paid in hard currency, partly due to price liberalization, partly due to rising world demand for steel. Since 1998, the free-on board (fob) import price of iron ore saw a 10 fold-increase, the fob import price of hard coking coal a 7 fold-increase. This plays a role mainly for Ukrainian producers, but also for non-integrated Russian mills. Energy prices rose substantially, differing for countries and energy carriers. Additional pressure came with the 2008 financial crisis, because the steep fall in steel demand caused a fall of export prices. Taken together, these developments led to a severe decrease of profit margins in steelmaking, made smaller mills especially in Ukraine non-profitable (Vlasyuk, 2011) and brought some Russian steelmakers to the edge of profitability. Incentives for either upgrading technology or pressure for market clearance were high.

In contrast to market forces, environmental legislation which is the responsibility of governmental actors, did not contribute to stimulate change towards more efficient technologies. Inherited from Soviet times, there are numerous pollution limits for the sector and its emissions and disposals. This end-of–the–pipe regulatory system persists till nowadays, but lacks efficiency: Pollution limits stayed nearly unchanged over decades, tariffs of fines did not cope with the pace of (hyper)inflation, and – most important – state capacities of monitoring pollution from stationary sources eroded together with the capacities (and partly the willingness) to collect fines. The Ukrainian Tax Code of 2010 introduced stepwise a tax on CO_2 emissions, but the amount of 0.2 UAH per ton (equal 0.02 €) is simply too tiny to set incentives for change. A cap- and trade-system of CO_2-emissions started with an experimental phase in Kazakhstan in 2013, however free allocated quotas reflected actual emission and hence also do not provide incentives for change.

Technological (non)progress and environmental effects in CIS steel

If we take specific energy consumption (energy consumption per ton of steel produced) as an overall indicator for technological change within the sector, we see that after 24 years of transition steel producing plants in CIS countries are still operating at much lower technical levels than in other countries. While Kazakhstan shows a major improvement in 1999/2000, Russia after 15 years is back at the starting point, while the data of Ukraine show high-efficiency at the beginning of transition followed by a pronounced deterioration of energy intensity that casts doubts on data quality. The storyline of poor energy intensity performance of CIS steel thus holds over time as well as in comparison to other steel producing countries. In Russia and Ukraine, the expectations of technological change induced by transition obviously have not been met.

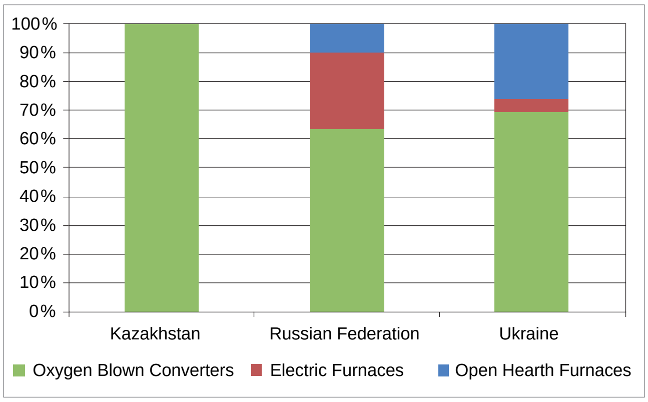
Figure 3: Energy intensity in CIS steel production (GJ/ton), 1995–2009



Source: IEA, Steel Statistical Yearbook, own calculations; The extreme low values for Ukraine demonstrate a problem with energy consumption data reported to IEA by Ukrainian authorities that lead to a systematic underestimation (IEA 2007, 106); Ukrainian sources report about 24 GJ/ton (Metallurgprom); Data before 1995 have been excluded due to inconsistencies and obvious misspecifications in reported consumption data.

While energy intensity provides first insights into technical change, it is not an ideal indicator if standing alone. Energy intensity in steel production depends not only on production technology and the operation control technology in place (re-use of by-product gases etc.), but also on the caloric content of primary energy carriers used, the product mix, the type of iron ore and coal used and their material efficiency. The biggest efficiency differences result from the input used – the production of primary steel that uses iron ore as input can be up to three times more energy intensive than the production of secondary steel that uses scrap as input. A complete decomposition of energy consumption that accounts for differences of technical specifications in the steel sector in our case is limited by obvious weaknesses of energy data quality, the low disaggregation level of these data, and the poor information on input and production routes available for the countries of interest.

Figure 4: Where are we now? Crude steel production by process (2011)



Source: Steel Statistical Yearbook 2012.

Thus, to determine closer the technological progress made in steel production we have to limit ourselves to a descriptive look on available data of shifts in production technologies product mix – but we should keep in mind that those shifts alone do not provide information on how technologically efficient and up-to-date these changes have been. Data on *production technologies* as published by the WorldSteel Association show that outdated and extremely energy intensive Open Hearth Furnaces (OHF) which consume by average 5 GJ/t more energy than Oxygen Blown Converters (OBC) are still widely used in Ukraine (which demonstrates clearly that energy consumption must be much higher than reported to IEA) as well as in Russia, while Kazakhstan switched completely to the use of OBC with the demonstrated tremendous effects on energy intensity. With respect to product mix, Kazakhstan has the most pronounced shift since it completely switched from ingot production to continuously cast steel. Estimated differences in energy consumption between these two techniques show a huge variation form 0.34 GJ/t to 5.5 GJ/t, so efficiency gains directly attributable to that switch are not clear.

Environmental effects of technological backwardness

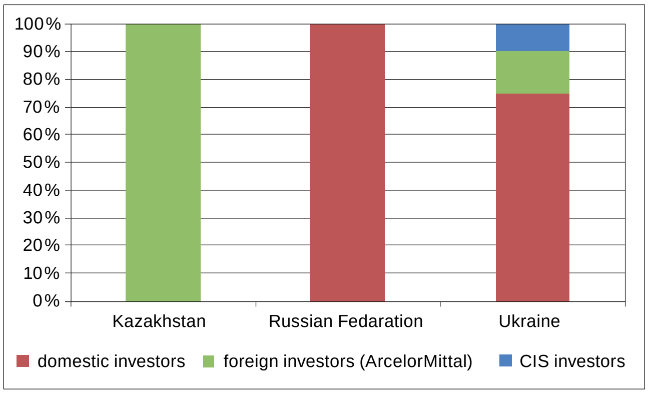
Technological backwardness has clear effects on emission intensity of the sector that is one of the "dirtiest" industrial sectors. Air pollution directly attributable to an enterprise can be observed within a radius of up to 100 km. Air pollutants are mainly CO, SOx, NOx and particulates (dust and fine particles, including heavy metals), but also CO_2 from fuel combustion. The older the technology used, the more sulphur contained in (unfiltered) energy carriers used, the more stockpiles of iron ore and coal kept on open grounds, the older the transportation technology used, the more energy used in sintering (to name only some examples) the more pollutants are emitted. The sector also discharges large volumes of contaminated water that had been used for cooling coke or steel; water contamination also stems from leaching of rainwater through piles of raw materials or through accumulated solid wastes. Heavy metals, oils and greases are released to local water streams and underground water. Solid wastes produced in the sector can be recycled to a large percentage – if the necessary technologies are in place. If recycling rates are high, hazardous wastes play a minor role.

Data on pollution stemming from the sector in CIS are rare and not consistent over years and countries. While all enterprises have to register their emissions in environmental passports that include their individual pollution limits, neither these data nor actual pollution from the sites are available to the public. The Russian Yearly Report on the Environment discloses only aggregated information of industrial pollution. The "Development Strategy of the Metallurgical Industry till 2020" in 2009 stated that the sector contributes 28% of industrial emissions; if the technical base is modernized, emissions will be reduced by more than 50%. It also states that in case of modernisation pollution will not exceed (timely set) limits in 2011 – thus indicating that this is not the case without modernisation. In Kazakhstan, where environmental information is structured alike, statistics show that the city Temirtau which is a steelwork mono-city, and the region Karaganda where the downstream coalmines are located, are among the most polluted places of the country. According to a textbook of 2005 dust emissions by steelworks are 2–6 times higher than limits set (Panin 2005). In Ukraine, the National Reports on the Environment since 2010 include a separate chapter on the metallurgical industry, but systematic information on emission intensity is missing. All big enterprises of the sector are among the 100 dirtiest of the country. The National Reports state that the equipment of the sector is extremely outdated and therefore environmental damage is extreme. Due to low energy efficiency, the sector in 2011 accounted for more than three quarters of industrial CO_2 emissions, with emission intensity rising. NOx emissions also rose at a higher pace than production. A serious concern comes from more than 22 Mio tons of non-recycled hazardous wastes that are stored at the territory of the enterprises and then transported to partly "unorganized" landfills – a problem that is prevalent in Kazakhstan as well.

The role of ownership in CIS steel

The analysis of ownership and technological change in CIS steel shows results that are somewhat puzzling. Privatization and market pressure should have induced technological change in all three countries simultaneously – but as we observed technological change was very limited in Russia and in Ukraine, whereas pronounced in Kazakhstan. In Kazakhstan, a foreign owner took over. In Russia steel plants are owned nationally (we treat ownership in tax havens like Cyprus as national), there was technological progress but energy efficiency stayed unchanged. In Ukraine, where we have mixed ownership (tax havens are treated equally), plant owners due to their dependency from imported inputs should have had the highest incentive to introduce new technologies and partially did so, but they are still using the most backward technologies on average and overall efficiency is unchanged. If steel plants in Ukraine and Russia are really working at the edge of profitability then they should either disappear from the market or restructure. Our assumption is that national steelmakers can rely on protectionist measures and subsidies so that there is no pressure for them to restructure.

Figure 5: Ownership structure of largest steel producing companies in CIS



Source: Own calculations based on: Fortescue 2011; Roland Berger 2012; annual financial reports of companies; for Kazakhstan and Russia only informations about total revenues of the companies are available.

The numerous EU anti-dumping investigations and the scope of measures taken – up to 35% extra ad valorem duties on different steel products had been raised against Russian and Ukrainian steelmakers in different investigations since 2006 – demonstrate that dumping in this industry is a matter of fact. By that time, it were mostly subsidized prices for gas (Russia) and gas plus electricity (Ukraine) that had raised concern of EU producers. Due to the non-cooperative behaviour of steel plant owners in disclosing accounting and other information to EU bodies, other factors had been practically out of reach when calculating applicable margins. However, besides cheap energy, numerous other protective measures have been taken by CIS governments, culminating in the aftermath of the 2008 crisis. In Ukraine the tariffs for railroad fright for iron and steel products have been frozen, as well as the tariffs for electricity and gas for the sector (till March 2010). In Russia, the governmental Anti-Crisis-Program 2009 provided financial support and access to cheap credits not only for banks, but also for "systemic" enterprises of the steel sector, as well as for the whole steel value-chain like car manufacturers and the defence industry.

Figure 6: Steel Oligarchs and their influence on politics (Ukraine)

Country	Largest owner(s)	Estimated wealth in bln (US-$, 2011)	Political influence
Metinvest **75% SMC** **20% Smart Holding**	R. Akhmetov	9,83	• preferential treatment in privatization process of steel plant (reversed by Timoshenko government) • Connected with Party of Regions (MP 2006–2012, donations) and its politicians (e.g. B. Kolesnikov, vice prime minister 2010–2012) • Influence on media through own media holdings
	V. Novinskiy	3,12	• Loyality of adminstrations of Kuchma, Yuschenko and Yanukovych towards Novinsky
Industrial Union Donbass	V. Hajduk S. Taruta O. Mkrtchan	n/a n/a n/a	• Supporting Orange Revolution (Tymoshenko, Yushchenko)
Donezkstal	V. Nusenkis	1,78	• Support of former attorney general of Ukraine Gennady Vasilyev • One of the "founding fathers" of Donetsk financial-industrial group with current members of parliament
East-One (Interpipe)	V. Pinchuk	3,16	• preferential treatment in privatization process of steel plant (reversed by Timoshenko government) • Son-in-law of former president Kuchma (1994–2005) • Owner of various companies in the media sector • Member of parliament 1998–2006 • Larger distance to politics since Orange Revolution
Privat Group	I. Kolomoysky H. Boholjubow O. Martynov	6,52 6,36 2,14	• Supporter of prime minister Y. Timoshenko until elections 2010 • Owner of various companies in the media sector • Faced with governmental pressure since 2010

But these open accessible (albeit not transparent) measures might in fact play only a limited role. If we examine plant ownership in detail, it becomes obvious how deep national plant owners in Russia and Ukraine are involved into politics. The so-called "Oligarchs" (Guriev/Rachinski 2005) as a matter of fact are among the richest men of their countries. In Ukraine, plant owners are seemingly split between the two ruling political parties. While this might rise hope that subsidizing practices might be revealed by competitors and hence stay limited, political history of Ukraine shows that this is not the case: Before elections, oligarchs played both sides and after elections even changed sides to secure their positions in an opportunistic manner rather than disclosing insider information to the public. State capture – influencing the rules of the game – thus can be played without control of external observers or independent media. Examples are numerous and reach from public procurement (e.g. for pipeline infrastructure), tax loopholes for steel holdings across borders or not-enforced tax payments to environmental damage caused but not attributed to the polluters. If CIS steelworks had to internalize these effects, to apply Best Available Technolgies and to keep the limits set in the EU Industrial Emission Directive, production of most enterprises would become unprofitable.

Figure 7: Steel Oligarchs and their influence on politics (Russia)

Country	Largest owner(s)	Estimated wealth in bln (US-$, 2013)	Political influence
Evraz	R. Abramowicz A. Abramow A. Frolow	10,2 4,2 n/a	• Member of Parliament and governor of Chukotka Autonomous Disctrict (2000–2008) (Abramowicz) • Preferential treatment in privatization process
MMK	V. Rashnikov	4,2	• Close ties to former Ministry of Industry and Energy (2004–2012) Viktor Khristenko • Supporting Putin in 2000 presidential elections
Severstal	A. Mordashov	12,8	• Supporting Putin in 2004 presidential elections • Member of advisory board of Ministry of Industry
NLMK	V. Lisin	14,1	• Close ties to V. Kozhin: Head of the Presidential Property Management Department of the Russian Federation
Mechel	I. Zyuzin	1,8	• 2008/2009: conflict with local authorities and public criticism of Mechel announced by Prime Minister V. Putin
Metallo-invest	A. Usmanov (50%)	17,6	• chairman of Gazprominvest Holdings • owner of media holding (Kommersant), purchase according to Kremlins strategy? • Close ties to former KGB personnel that is closely connected with V. Putin
	A. Skoch (30%)	7,9	• Member of parliament since 1999 (among others: United Russia); chairman of advisory council on metallurgy (2000–2003)
	V. Anisimov (20%)	2,9	• n/a

Conclusion

Expectations that "the market" would solve the problem of inefficient and dirty steel production in CIS have not been met. Oligarchic structures that emerged after privatization are in no need of technological progress as long as their enterprises are subsidized and protected by their governments. While modern governments stimulate technological change and move towards a post-carbon development path, CIS governments still act as if unconstrained by energy resources and environmental factors. Since European policy makers are concerned by price-dumping of importers and environmental issues alike, technological efficiency and environmental aspects of production should be considered in anti-dumping investigations and the design of trade agreements. A border adjustment carbon-tax as discussed by now will not be enough to capture these aspects and to overcome the locked-in situation within CIS countries.

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http://www.osteuropastudien.uni-muenchen.de/personen/studierende/2012/wittmann/index.html