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CCSI Policy Paper

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Key Points

- 1 The location of the coal and iron-ore deposits were key determinants for the establishment of the iron and steel industry in the Donets Basin. Also, domestic infrastructure projects led to the growth of the iron and steel sector in Tsarist Russia.
- 2 The private sector played a key role in Ukraine's early successes, through their provision of foreign direct investment and advanced technologies.
- 3 The Ukrainian steel industry experiment and the regional policy investment incentives applied from 1999-2003 were successful, in that they resulted in an increase in fixed capital investment and modernization of production capacities that resulted in efficiency gains.
- 4 While favorably located to export into regional markets, competing at an international level is significantly more difficult than relying on the domestic market for growth, as demonstrated by Ukraine's iron and steel sector today.

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Downstream Beneficiation Case Study: Ukraine

Introduction

Ukraine was selected as a beneficiation case study due to the presence of longstanding interconnected coking coal and steel industries with documented iron ore beneficiation beginning as early as 1869 in the Donets Basin and continuing to the present. While other regions in Ukraine have historically benefited iron ore, such as the Urals, for the purpose of this examination only the conditions related to the development and maintenance of the steel industry of the Donets Basin will be analyzed.

The Donets Basin is interesting because not only has the Donets Basin historically possessed all the necessary raw inputs to foster resilient domestic iron ore beneficiation, the region has also experienced varied political, economic, and social outlooks that have had both direct and indirect effects on the development of integrated steel industries. For the purpose of this case study, the periods to be examined will be defined as the industrialization of Tsarist Russia (1869-1917) and the post-Soviet Period in Ukraine (1991-2013). While the steel industry also expanded during the Soviet era, this period was marked by strict price controls and central planning policies, which created inefficiencies and ultimately contributed to the fall of the Soviet Union. The steel industry during the latter half of this period was characterized by managerial inefficiency, inadequate price design and response, as well as incorrect incentive structures. The result of these factors was that by the mid-1980's the Soviet iron and Steel industry lagged far behind Western Europe, Japan, and the United States in the development and implementation of new technologies that shaped the way steel was to be produced in the 1990's. Given that this research project assesses the economic factors that incentivize the steel industry, this period is not analyzed in greater depth.

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Industrialization of Tsarist Russia

The industrialization of the Donets Basin and the establishment of iron ore beneficiation industries in the region were initially made possible due to the development associated with agricultural production and grain exports. The nineteenth century Russian Empire was marked by profound changes in both political and economic geography. Serfdom was abolished in 1861, which made available to the industrialists a huge amount unskilled human capital. Ukraine developed rapidly as an exporting agricultural region, which is exemplified by the fact that throughout the period 1860-1913 over three-quarters of Russia's exports were agricultural products.ⁱ It was during this period that Russia was nicknamed 'the granary of Europe'.ⁱⁱ This development as an agricultural exporter of grains resulted in the expansion of railways, thus making it possible to develop the Donets' and Krivoi Rog's coal and iron ore. While the railroad was extended and completed to support the export of agricultural products such as grain, industrialists recognized the new opportunities that it presented for the development of an integrated iron and steel industry and seized upon them. The major turning point in Russian industrial history came in 1884 with the completion of the rail road project that made it possible to join the coal of the Donets Basin and the iron ore of Krivoi Rog, as depicted in **Map 1**, with the more developed central regions of Russia.ⁱⁱⁱ While coal extraction had been going on in the Don Region and Ekaterinoslav Province since the late 18th century, the greatest boom in Donbas coal production was fueled by foreign investment beginning in the late 19th century.^{iv}

Foreign investors connected the coal production to steel making, drawing on iron reserves of Krivoi Rog two hundred miles west of the coalfields.^v The first foreign company to enter the market was the New Russian Company for the production of Coal, Iron and Rails in 1869, led by John Hughes, a Welsh engineer-entrepreneur. Hughes and his successors developed the heavy industry of South Russia in the 1880's and 1890's – profiting from the symbiotic relationship among coal steel and railroads.^{vi} This was characterized

Map 1. Southern Russia, 1914



by a great influx of foreign capital at the turn of the century that further speeded railroad construction, and also the development of export industries, specifically grain and coal in Ukraine.^{vii} The French and Belgians

were the most heavily invested in Donbas, having spent 550 million Francs and 275 million Francs respectively by 1900, which is equivalent to approximately \$US 3.4 billion in today's market (Insee, 2015). This foreign investment resulted in the Donets Basin surpassing older regions, such as the Urals, in the production of coal, pig iron, and steel by the mid-1890's.^{viii} The great increase in demand for materials, resulting from the boom in railroad construction, stimulated the growth of heavy industry in the Donets Basin. The region had access to superb resources of iron ore, coal, limestone and refractories, was well located with respect to food supplies, and had a rapidly developing system of transportation.^{ix}

With this rise of the coking coal and steel industries came the establishment of an extremely important trade group with regard to the development of iron ore beneficiation in the Donets Basin. In 1874, The Association of Southern Coal and Steel Producers was established; this organization's establishment corresponded with the birth of the Donbas coal and steel industry.^x This is significant because the Association acted to catalyze the boom with the provision of foreign direct investment, management, and engineering expertise, education in the form of schools, and acted as a government liaison/lobby. Furthermore, the activities of the Association's members set the stage for rapid Soviet industrialization.

Free access to domestic markets and protection from foreign competition were crucial components of the Association's position with regard to government intervention. In the 1880's the government began promoting the substitution of foreign pig iron with domestic pig iron from South Russia (Donets Basin).^{xi} Lobbying efforts by the Association yielded results in 1887, with the government implementing duties on imported iron ore of 8.54 \$US/metric ton (~212 \$US/MT 2014 prices) and 10.37 \$US/metric ton (~260 \$US/MT 2014 prices) via ports and overland transport respectively. Duties were also levied on other imported iron and steel products, most significantly iron rails used for rail-road construction. The impact of this was drastic,

with imports of pig iron dropping from 229,329 metric tons in 1886 to 73,713 metric tons in 1888.^{xii} At the same time, this tariff protection facilitated the growth of domestic pig iron production in the Donbas region, seeing an increase from 49,142 metric tons in 1887 to 720,750 metric tons in 1898.^{xiii} These trade policies enacted by the government helped the steel producers capture the domestic market and facilitated significant growth during the formative years of the industry. This guaranteed domestic market created by the protectionist trade policies acted to catalyze engagement by foreign investors who saw this as an opportunity to capitalize. With their superior technologies and abundant financial resources, this resulted in the establishment of a vast integrated steel industry in southern Russia.^{xiv}

Table 1. Pig Iron Production

Production of Pig Iron (Metric Tons)			
Year	All Russia	South Russia	
	Production	Production	Blast Furnaces
1887	602,803	64,473	5
1888	656,433	85,448	6
1889	734,547	139,781	8
1890	911,882	213,266	9
1891	988,940	245,688	11
1892	1,054,913	274,547	12
1893	1,117,887	320,319	13
1894	1,285,062	437,754	13
1895	1,400,274	542,920	13
1896	1,562,568	628,691	17
1897	1,838,129	757,000	25

This table was created by the author from data originally published in the *Journal of Iron and Steel* v.55 1899 no. 1 page 566

Table 1 shows the growth of pig iron production in South Russia from 1887 to 1897 in relation to overall Russian production. The growth pattern points to a positive correlation between the implementation of the

import tariffs in 1887 and the growth of the domestic iron ore beneficiation industry in South Russia. **Table 2**, below, depicts Russian production vs. consumption of pig iron from 1882 to 1897. Annual production was consistently lower than annual demand making it likely that exports during this period were minimal. In fact, Table 2 also shows that from 1882 to 1895, exports of pig iron were very small with regard to total production. In 1887, exports represented ~ 2.3% of total production for that year and, in 1891, exports represented only 1.9% of total production for that year. What this translates to is that all new iron works being built during the period of early 1880's to 1900 were focused on meeting demand in the domestic markets. This supports the notion that the foreign companies were investing in the Donbas region with the goal of building iron ore beneficiation industries in order to supply the domestic market while avoiding import duties on their products. However, while there was a large increase in domestic production, there are still significant levels of imports despite the presence of import tariffs.

Table 2. Pig Iron Production vs. Consumption

Amount of Pig Iron (Including Iron and Steel) Metric Ton				
Year	Exported	Imported	Production	Consumption
1882	12,482	573,214	498,400	1,023,277
1884	9,796	599,227	509,525	1,098,957
1887	14,006	309,581	602,803	908,038
1891	11,876	326,584	988,940	1,319,492
1893	NA	409,517	1,117,887	1,679,000
1895	NA	779,760	1,400,274	2,234,000
1897	NA	835,415	1,838,129	2,727,000

This table was created from data originally published in the Journal of Iron and Steel v.54 1898 no. 1 page 586 and from data originally published in the Journal of Iron and Steel v.51 1897 no. 1 page 608

Foreign capital accounted for roughly one-half of all new investment in industrial corporations during this period.^{xv} Along with this foreign capital came engineer-managers, industry expertise, and advanced technologies. All of these elements contributed to the establishment of a successful iron ore beneficiation industry. The early industrial pioneers, who came to invest in the Donbas Basin, were confronted with significant obstacles to industrialization that included foreign control of capital, the total absence of housing, health facilities, and other vital amenities to workers.^{xvi} Beyond the lack of any substantial physical infrastructure, there were also a number of institutional blocks to the industrialization efforts that included diverging sectorial interests, state taxes, tariffs, and railroad policies that pitted agricultural producers against industrialists.^{xvii} Yet, despite the challenging climate that these physical conditions created, the industrial pioneers, led by foreign interests, were able to surmount them and forge the foundation of a strong industry that is still productive today. **Table 1** (see previous page) illustrates the consistent increase in output of pig iron in Russia from 1887 to 1914. What is truly instructional from the table is that each year the production from South Russia represented a greater percentage of overall Russian production, accounting for only ~9.3% of production in 1887 and rising to ~ 57% of total production by 1910.

Engineers who represented foreign firms were the most predominant in the leadership of the Southern Association. This is illustrated by the fact that, out of the 24 council members sitting on the board of the Southern Association in 1905, 16 were engineers, 14 worked for foreign forms, and ten of those fit both categories.^{xviii} These engineer managers embraced the free market/free labor market, but favored government intervention in the form of tariffs, preferential freight rates, and support for railroad building.^{xix} Furthermore, members of the Association understood that making steel required education and they promoted technical enlightenment by founding and supporting mining schools.^{xx} Most managers that represented foreign interests were of Russian and Ukrainian descent, which helped them to balance the interests of their employers with the interested of their country and local laborers.

Beyond its successes at establishing advanced production technologies while providing educational resources along with other basic amenities to their workers, the Association was also successful in getting the government in St. Petersburg to pressure the local state government (zemstvos) to equalize taxes on agricultural and industrial properties.^{xxi} Traditionally, the local government was populated by landowners and thus decisions such as how to appraise property and levy taxes on income and capital assets fell in favor of the agriculturalists, resulting in an inequitable burden falling upon the industrial sector, especially with regard to proportion of taxes collected.

Through its organization, the Association helped to drive government policies that that facilitated the establishment and growth of iron ore beneficiation in South Russia. These policies can be summarized as follows:

First, the government provided high tariff protection for industry. This resulted in guaranteeing an advantage to domestic producers over foreign producers, thus encouraging the development of domestic production capacity. While the government was fostering domestic industry through the implementation of these tactics, it was equally interested in the revenue that was generated through the establishment of import duties. Second, the government accounted for the greater part of new railroad construction, with railroad construction being the receipt of the heaviest financial support from the government. The approximation for expenses in direct railroad construction and for the subsidization of private railroad construction was 1 billion rubles (approximately \$US 550 million in 1890) over the period of the 1880's-1890's.^{xxii} The Russian railway system almost doubled from 1889 (18,600 miles) to 1901 (35,000 miles). The government also practiced a policy of placing orders for rails at a fixed price that was guaranteed for several years, helping to stabilize the industry. Furthermore, the government simultaneously bought numerous private companies for top prices, so that by 1901 government railroads constituted two-thirds of the total rail network. This large expenditure and expansion of the railroads guaranteed a solid domestic demand that catalyzed the growth of production capacity in Southern Russia and also encouraged foreign

Table 3. Increases in Production

Production of Pig Iron (Metric Tons)		
Year	Production	
	All Russia	South Russia
1888	656,433	85,448
1890	911,882	213,266
1892	1,054,913	274,547
1894	1,285,062	437,754
1896	1,562,568	628,691
1898	1,867,119	1,002,318
1900	2,937,365	1,437,963
1902	2,598,295	1,379,658
1904	2,949,818	1,814,512
1906	2,641,264	1,645,264
1908	2,748,000	NA
1910	3,521,000	2,013,260
1912	4,118,000	NA
1914	4,547,000	NA

This table was created from data originally published in the *Journal of Iron and Steel* v.51 1897 thru v.90 1914

direct investment in the country; these two movements went hand in hand. Finally, the government engaged in a public relations campaign to enlist support for industrialization at home and abroad. Examples of the tactics employed through this campaign included the release of propaganda at the national level, which supported the economic policies for industrialization and through the solicitation of FDI from the private sector in countries such as Belgium and France.^{xxiii}

Centralized Planning in the USSR (1928-1991)

While the Soviet Union experienced a huge industrial expansion and relative economic stability during the series of 5-year plans that guided the course of the economy in the Soviet Union (1928-1990), the centralized planning during this period was characterized by many inefficiencies, due to a lack of both market signals and incentives for innovation. Furthermore, the structure of the iron and steel industry in communist Russia was uncompetitive and by the mid-1980's the Soviet iron and Steel industry lagged far behind Western Europe, Japan, and the United States in the development and implementation of new technologies that shaped the way steel was to be produced in the 1990's. This is evidenced by the huge drop in production during the economic transition that ensued after the collapse of the USSR. This is another reason why the iron and steel industry of the Soviet Russia is not examined in more detail in this case study.

Ukrainian Steel Industry in Transition (1991-2013)

After the breakdown of the Soviet Union in 1991, Ukraine inherited a large complex of mining and metallurgical enterprises equal to about 35% of the whole USSR industry.^{xxiv} The post-Soviet transformation had an enormous impact on the Ukrainian iron and steel industry. While production in Ukraine reached its peak of 56.5 million tons per year in 1985, production of steel in Ukraine dropped dramatically to 15.9 million tons by 1995.^{xxv} Furthermore, within the first five years of Ukraine's newly gained independence, the production of ferrous metals plummeted by almost 60%. From 1990 to 2002 Ukraine's share in the world steel production halved to 4%.

The collapse of Ukraine's domestic market for ferrous metals was the major cause of the industry's crisis in the first half of the 1990s. With the breakup of the Soviet Union, Russia and the Commonwealth of Independent States (CIS's) were in economic turmoil which resulted in a greatly diminished demand for, and thus output of, capital goods, military armaments, and construction, with these accounting for the major domestic consumption of steel.^{xxvi} All in all, from 1993 to 2002 the domestic consumption of crude steel shrank by 80%. Despite these stark realities, by the late 1990's Ukraine had become the third largest steel-exporting country. By 2013, upwards of 80% of Ukraine's output from the metals and mining sector was destined for export.^{xxvii} This represents a shift from producing for the domestic market to being heavily reliant on export markets, leaving the Ukrainian industry at the mercy of the highly competitive world market. The post-Soviet transformation positioned steel products to become the single largest Ukrainian export commodity, accounting in 2002 for 30% of the country's total merchandise exports and worth \$US 5.3 billion. This trend has continued. As of 2013 the steel industry of Ukraine continued to provide over 30% of goods exported and accounted for over 20% of foreign exchange earnings.^{xxviii} In addition to its steel exports, Ukraine is also the world's 4th biggest exporter of iron ore. In 2013 as much as 37.98 million metric tons - almost half of the iron ore produced - was exported, mainly to China (46.3%), Czech Republic (12.2%), and Poland (10.4%).

One of the most significant challenges that the Ukrainian iron and steel industry has faced during the post-Soviet period, and continues to face today, is its obsolete production facilities and outdated technology.

These factors have contributed to the low levels of efficiency, productivity, and profitability and a focus on low value-added products. The pervasiveness of the low value-added products is illustrated by fact that steel production is predominantly ingots, the most elementary crude steel product. In terms of the stifling inefficiency that permeates the industry, not only has the average Ukrainian steel worker become one of the least productive in the world, but also the average production per worker is less during the post-Soviet period than under late state socialism in the 1980's.^{xxxix}

To add insult to injury, the Ukrainian iron and steel industry has faced restricted access or been barred altogether from export markets for its products. Since 1992, the Ukrainian iron and steel industry has been subject to numerous anti-dumping investigations and external market restrictions (IMF, 2003). As a result, the export opportunities of the Ukrainian iron and steel producers were badly damaged by a wave of anti-dumping sanctions, import tariffs, quantitative restrictions, and other protectionist measures imposed by the European Union, the United States, and a number of other steel-producing countries.^{xxx} Recently, on 27 June 2014, the EU and Ukraine signed the Deep and Comprehensive Free Trade Area (DCFTA) as part of their broader Association Agreement (AA). In April 2014, in response to the security, political and economic challenges faced by Ukraine the EU unilaterally granted Ukraine preferential access to the EU market until 31 December 2015. To avoid further destabilization of the country, and in particular to guarantee Ukraine's access to the CIS market under the Ukraine-Russia bilateral preferential regime, in September 2014 the EU postponed implementing the DCFTA until January 2016 (European Commission, 2015).

The first governmental initiative during the post-Soviet period intended to directly target reform in the iron and steel industry was *'The Conception of the Development of Ukraine's Mining and Metallurgical Complex until 2010'*, approved by Ukraine's parliament on 17 October 1995 (Vidomosti Verkhovnoi Rady No. 39, 1995). This legislation emphasized the leading regulatory role of the state to be played in the process of essential industrial restructuring, privatization, and adjustment of Ukraine's metals sector to the realities of post-communism and globalization. This initiative also recognized the Ukrainian steel industry's problems in terms of production technology, product diversification, international marketing, and provided for a number of activities aimed at the transformation of the Ukrainian metals sector into a more balanced, competitive, efficient, and environmentally conscious industry.^{xxxi}

The *'Conception of the Development of Ukraine's Mining and Metallurgical Complex'* was followed by a number of legislative initiatives and executive orders concerning the operation and restructuring of the Ukrainian iron and steel industry (See **Appendix 1**).^{xxxii} Additionally, the initiative titled *'On Special Economic Zones and a Special Regime of Investment Activities in Donetsk oblast'* (See **Appendix 1**) was passed on 14 January 1999. This law established a special regime of investment activities within Donetsk oblast's territories for prioritized development, which covered almost the entire provincial area. Corporate eligibility is delineated by a minimum proposed investment of at least \$US 1 million (\$US 250,000 for small firms). Commercial entities that meet the requirements and operate within the priority development territory are provided with a large number of tax breaks and allowances, customs duty, and other incentives for the period of 30 years (see **Table 5. See next page**). While the initiative applied to all industries in the Donetsk oblast, the industry of the region is predominantly engaged in mining and metallurgical activities. As a result, the Donbas ferrous metals companies have been able to make additional fixed capital investments within this special regulatory regime.^{xxxiii} The Ukrainian steel industry state assistance policy and the regional policy investment incentives have led to a substantial increase in fixed capital investment into the ferrous metals sector. In addition, modernization of production capacities undertaken by a number of Ukrainian steel companies during the course of the sectorial experiment resulted in substantial efficiency gains. While, some significant modernization projects have been executed, in general the ferrous industry

remains largely obsolete, lacking in any substantial investment and needing to significantly improve energy efficiency.^{xxxiv}

More recent pressures, associated with higher costs imposed by Gazprom, have acted to catalyze the modernization of the industry through improvements in energy efficiency, steel quality, and output. Interpipe Steel built the first completely new rolling mill in Ukraine in 40 years, with the plant being commissioned in 2012. The company claims it has reduced gas consumption per ton of steel produced by upwards of 90%. ArcelorMittal, Ukraine's largest investor, has pumped more than \$US 1 billion into improving efficiency at the country's largest mill, Kryvyi Rih, with gas consumption rates at this factory being cut from 43 to 35 cubic meters per ton of steel produced.^{xxxv}

A brief resurgence was enjoyed by steel the industry in early 2000s, which correlated with the governmental "state assistance policy". However, in 2008 the steel sector was severely hit again, this time by the global recession. Within the last few years its output of crude steel fluctuates in the range of 30 to 35 million metric tons, following the demand of the international markets. After ranking 7th in world steel production in 2006, Ukraine was overtaken by rapidly developing countries, specifically India, Turkey, and Brazil. Ukraine

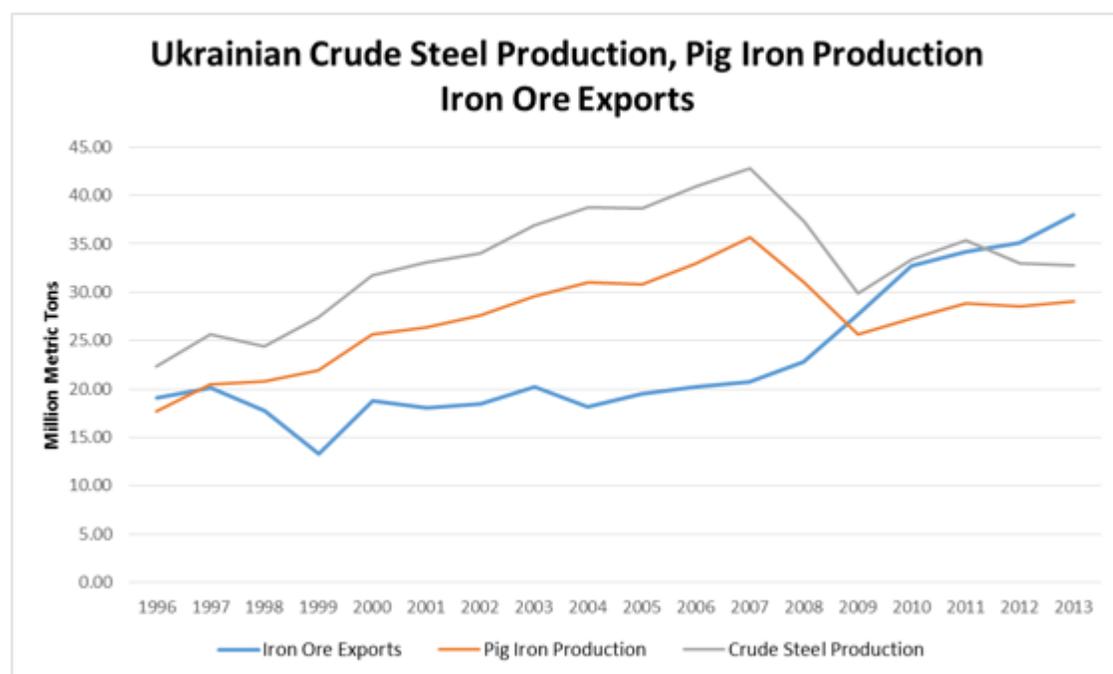
Table 5. Tax Incentives in the Donetsk Priority Development Territories

Tax incentives provided in priority development territories, Donetsk Region, 1999	
Type of exemption	Priority Development Territory
Duration	30 years
Corporate income tax	0% rate for the first 3 years, 50% of the current tax rate afterwards*
Value-added tax	0% rate for the first 5 years
Non-resident personal income tax	2/3 of current tax rate
Investor dividend tax	10% rate
Custom duties	0% rate
Social insurance contributions	50% of current rate
Minimum investment project	US\$ 1 million; US\$ 250,000 for small firms

* Provided profit is gained during the next 4-6 years

Source: Verkhovna Rada of Ukraine, 'The Law of Ukraine: On Special Economic Zones and a Special Regime of Investment Activities in Donetsk Oblast, available at <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi>

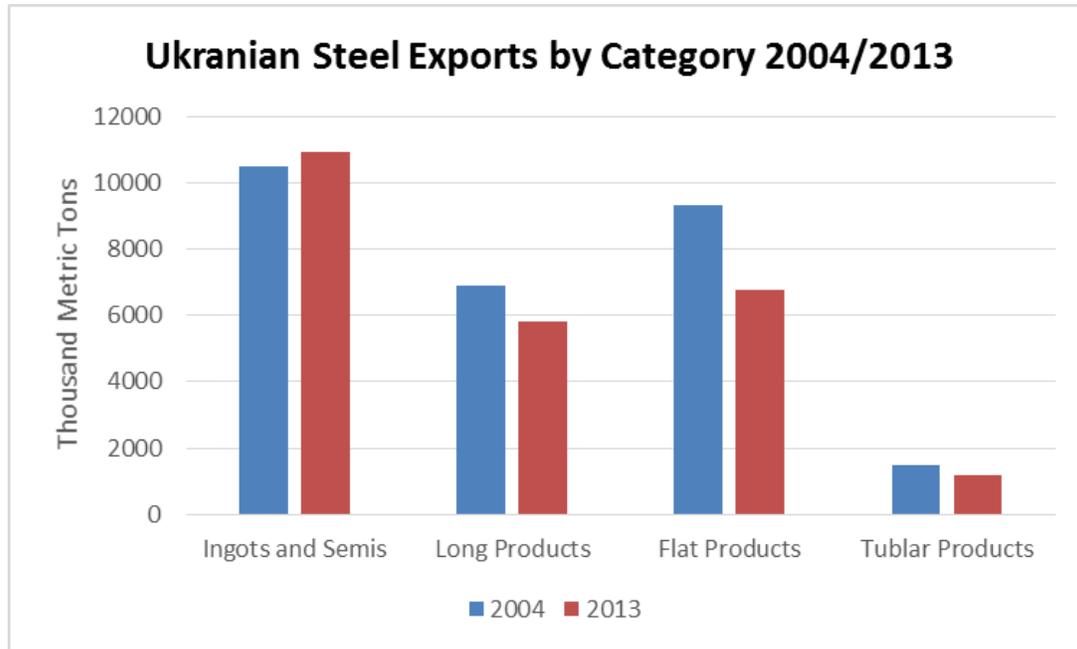
Graph 1. Crude Steel Production, Pig iron Production and Iron Ore Exports



This graph was created from data sourced from UN COMTrade and the World Steel Association

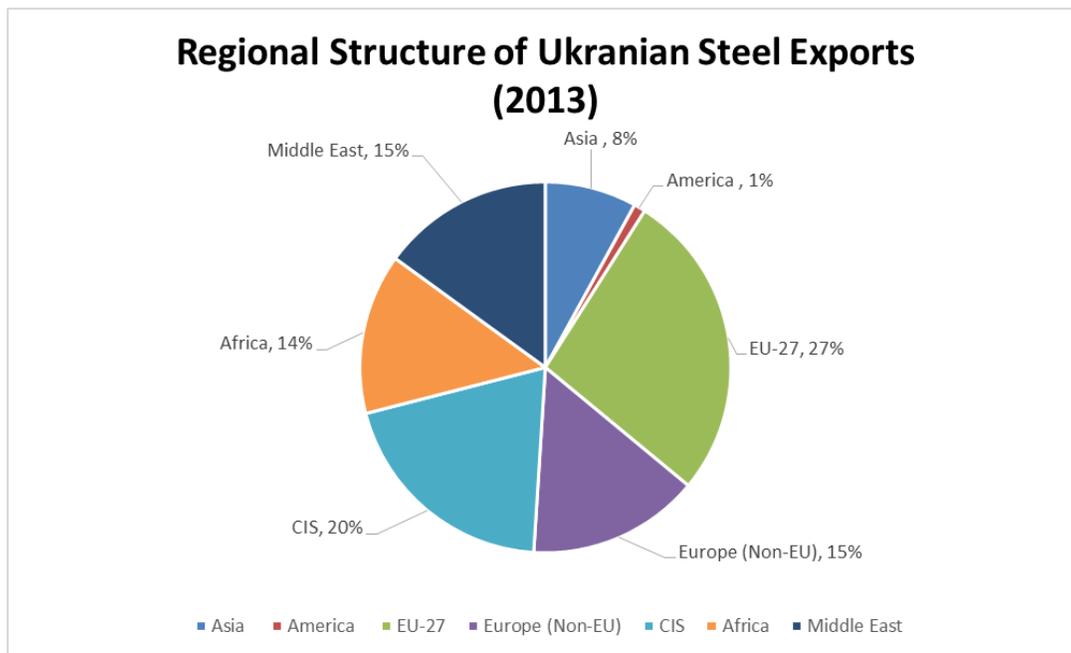
now only occupies the tenth position in the world, for crude steel production, producing 32.8 million metric tons in 2013.^{xxxvi} In terms of steel exports, as of 2013 Ukraine ranked 5th in the world with exports totaling 24.7 MMT. Trends in the Ukrainian iron and steel industry are depicted in **Graphs 1 and 2.**

Graph 2. Steel Exports by Category



This graph was created from data sourced from the WSA Statistics Yearbook 2014

Graph 3. Regional Structure of Steel Exports



This graph was created from data sourced from the State Statistics Service of Ukraine

Ukrainian Steel Industry: Advantages and Challenges

Ukraine has a number of advantages when it comes to its domestic iron and steel industry. It has one of the largest iron ore reserves in the world and has abundant availability of other resources such as coking coal, manganese ore, and limestone. These conditions contribute to its ability to support a large domestically integrated steel industry. In addition, Ukraine has infrastructure in place and an abundance of well-educated human capital. Furthermore, the steel producing centers are well located with respect to sources of raw inputs, such as iron ore and coal deposits. Additionally, Ukraine's steel producers are in close proximity to important markets such as Europe, CIS, the Middle East, and North Africa, with the proximity to these market places showing a positive correlation by share of total steel exports as depicted in **Graph 3** above. While the industry is suffering from technological obsolescence, it has a high potential for technological improvements that will increase its competitiveness in the global market. More recently, a devalued currency has made Ukraine one of the cheapest places in the world to produce steel. On top of all the advantages listed above, Ukraine has a huge potential to grow its domestic steel market.

Despite the overwhelming number of advantages Ukraine holds, its steel industry is still facing significant challenges. Probably the most significant disadvantage that Ukraine faces is its weak domestic consumption and dependency upon export markets. This reliance upon export markets leaves the industry at the mercy of world prices and facing competition from producers, who use on average 30% less energy to produce similar products and have higher rates of productivity per worker.^{xxxvii} Low productivity per worker in Ukraine is mainly a symptom associated with obsolete technologies and the use of open hearth furnaces to produce steel. As the Ukrainian steel industry continues to modernize and decommission older production facilities, productivity will become on par with its EU neighbors.

Another challenge that the Ukrainian industry faces has to do with the quality of domestic iron ore and coal being extracted. A large percentage of the iron ore requires significant beneficiation because the ferrous content from open pits in Ukraine is on average only around 26-33%. There are also issues associated with the domestic coal supply; the coals are deep-mined (making mining more dangerous and expensive), they are high in sulfur content which results in lower quality steel products, and domestic coking grades are scarce requiring coke imports or the implementation of costly capital improvements to make up for the deficit. Furthermore, the assets used in production are highly depreciated and need to be replaced/upgraded. Finally, the quality of the finished steel produced needs to be improved, as a large proportion of production is semi-finished and other products with low added value. The production of lower quality steel is associated with the quality of the domestic inputs while the production of low value added products mainly stems from the obsolete production facilities.

Key Conclusions

The Ukrainian iron and steel industry serves as an instructive case study both in terms of the factors that contributed to its early successes and its transformation during the post-Soviet period beginning in 1991. While not all of the factors that were key ingredients in the establishment and growth of the industry are as relevant today as they were during the infancy stages of development, all are worth examining when trying to develop policy mechanisms that aim to foster the development of downstream beneficiation. Furthermore, many of the challenges that the industry faces today, in terms of competitiveness, efficiency and access to markets are ubiquitous among players in the iron and steel industry.

There are a number of factors that contributed to the early successes realized during the establishment and

formation of the iron and steel industry in Ukraine. In terms of trade policy, the government provided high tariff protection for the industry, which resulted in a guaranteed advantage to domestic producers over foreign producers, thus encouraging the development of domestic production capacity. These types of policies only yielded measureable results because Ukraine also had a robust domestic demand for iron and steel, of which a significant portion was attributed to government contracts. The Russian government accounted for the greater part of new railroad construction, with railroad construction receiving heavy financial support from the government. This created a climate of steady demand and stable prices for steel, which allowed for the industry to flourish but was not sustainable over the long term as was evidenced from great fluctuations in production numbers and employment that accompanied increases or decreases in government spending on the railway expansion.

The private sector played a key role in Ukraine's early successes through their provision of foreign direct investment and advanced technologies. The early foreign pioneers brought highly skilled engineers and managers that balanced the demands of their foreign employers, while understanding the social, political and economic needs of the region where they operated, which contributed to the overall success of the industry. The private sector was also responsible for the creation of an industry association that communicated the needs of the industry to the national government, which contributed to favorable tax and trade policies being implemented. While early government intervention was aimed at protecting domestic producers and stimulating domestic demand, contemporary interventions have been more complex, with the goals of an industry overhaul and weathering recession.

The Ukrainian steel industry state assistance policy and the regional policy investment incentives applied from 1999-2003 were successful in that they resulted in an increase in fixed capital investment and modernization of production capacities that resulted in efficiency gains. This state assistance policy also helped to alleviate strains associated with the European recession of the early 2000's. Despite the movement by the Ukrainian government to implement exemptions and investment incentives in the late 1990's and early 2000's, these have not addressed the issues associated with a lack of demand for steel in the domestic market. The importance of having a robust domestic or regionally integrated market demand for steel is reinforced by the recent experiences of Ukraine's contemporary steel industry, where a lack of domestic demand and loss of Russia as an export market, due to the separatist conflict there, have left the steel industry solely at the mercy of the international market, where price fluctuations, oversupply and world economic down turns have been shown to have disastrous effects.

Like its humble beginnings, foreign investment/ownership and advanced technologies still play a key role in Ukraine's steel industry today. The post-Soviet steel industry's privatization and consolidation was executed in a large part by multi-national steel manufacturing corporations like AcelorMittal. Along with these new partners/owners has come workforce reductions and capital improvements aimed at addressing issues associated with production cost, quality, and energy consumption per unit of steel produced, which have increased the industry's competitiveness in the world market. In order for Ukraine to improve its competitiveness in the world steel markets it will be necessary for the steel industry to continue to upgrade its production capacities to include more continuous casting facilities and to decommission its outdated open hearth furnaces. It is also necessary to address issues associated with quality and availability of coking coal.

Appendix

Name	Date	Description
The Conception of the Development of Ukraine's Mining and Metallurgical Complex until 2010' (Vidomosti Verkhovnoi Rady No. 39, 1995).	1995	This legislation emphasized the leading regulatory role of the state to be played in the process of essential industrial restructuring, privatization, and adjustment of Ukraine's metals sector to the realities of post-communism and globalization. This initiative also recognized the Ukrainian steel industry's problems in terms of production technology, product diversification, international marketing, and provided for a number of activities aimed at the transformation of the Ukrainian metals sector into a more balanced, competitive, efficient, and environmentally conscious industry.
Vidomosti Verkhovnoi Rady No. 38, 1999 and Vidomosti Verkhovnoi Rady No. 17, 2002	1999 & 2002	The Laws of Ukraine 'On Economic Experiment at Enterprises of Ukraine's Mining and Metallurgical Complex' (valid from 14 August 1999 until 1 January 2002), and 'On the Further Development of Ukraine's Mining and Metallurgical Complex' (valid from 1 January 2002 until 1 January 2003), provided the majority of domestic steel producers with a number of state assistance measures: (a) penalties and fines charged for untimely paid taxes, duties, and other mandatory payments were written off; (b) ferrous and non-ferrous metals enterprises were provided with tax allowances for fixed assets depreciation; (c) some share of the mandatory payment by metals companies of the 'state innovation fund' tax, the 'enterprise profit' tax, the 'value-added' tax, and the 'environmental pollution' duty were to remain at the respective companies and used directly for technology improvements and environmental safety measures; and (d) ferrous and non-ferrous metals companies covered by the two laws concerned were released from paying the 'general usage motor-way maintenance' duty.
On Special Economic Zones and a Special Regime of Investment Activities in Donetsk oblast Vidomosti Verkhovnoi Rady No. 7, 1999	1999	This law established a special regime of investment activities within Donetsk oblast's territories for prioritized development, which covered almost the entire provincial area. Corporate eligibility is delineated by a minimum proposed investment of at least US\$ 1 million (US\$ 250,000 for small firms). Commercial entities that meet the requirements and operate within the priority development territory, are provided with a large number of tax breaks and allowances, customs duty and other incentives for the period of 30 years .

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