THE ECONOMIC IMPLICATIONS OF GOVERNMENT SUPPORT FOR THE STEEL INDUSTRY: CASE OF UKRAINE[1]

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Abstract

During the transition period, the Ukrainian steel industry appears to be one of the industries favored by the government in different ways: tax subsidies in the form of tax arrears, writing-off and restructuring of the arrears, tax privileges in the framework of the "economic experiment" at ore-mining and metallurgical enterprises; forbearance towards overdue payables and non-monetary transactions; and granting of bank loans under government's guarantees. The major objective of the paper is to look at the economic implications resulting from government support for the steel industry, and at the net welfare implications, in particular. Government interventions usually tend to create deadweight losses that should be taken into account when government policies are designed and implemented and public benefits should be compared to these public costs. A partial equilibrium analysis is applied to study the effects of an ad-valorem subsidy in the form of foregone budget revenues as a result of the reduction of the existing EPT rate (30%) by 21% percentage points for metallurgical enterprises under small- and large-country assumptions. The paper concludes with some policy implications and recommendations.

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Introduction

Subsidies to the economy, though reduced, continue to be one of the important items of expenditures in many transition economies. Subsidies are widespread in market economies as well. The subsidies to the energy, water, transport and agricultural sectors (these are essentially price subsidies) are characteristic for many industrialized and developing economies. The major distinction between such subsidies in transition and developed countries lies in their volumes, transparency and control.

The motives for the government support are similar for developed and developing countries: economic development, protection of employment and investments, protection of the domestic industry, support of the poor, etc. The results of the government support, however, appear to differ considerably from country to country. For instance, on the one hand, the Irish Industrial Development Authority's strategy to attract investment in the computer hardware and software industries resulted in a rapid economic development of this country in the 1990s, on the other hand, the UK government's strategy to support its coal-mining industry through grants and subsidies resulted eventually in the shutting-down of a number of mines (Downey 2000). Usually, the government support is associated with negative effects, such as inefficiency in resource allocation, impediments to competition policy, trade distortions, fiscal burden, etc.

In transition economies the problem of subsidies becomes more complicated due to the existence of a variety of indirect subsidies, e.g., privileged taxation, soft credits, trade credits, debts on banking credits and to the budget, etc. Some of them can be characteristic for advanced economies as well where they are more controllable and transparent. Indirect support of economic activity became most important in the 2nd half of 1990s in a number of countries of the former Soviet Union, including Ukraine as well.

Though the structure of the consolidated budget expenditures in Ukraine shows that the government has set priorities in its policy, with social expenditures occupying a noticeable part in the expenditure structure, the size of the government in the economy continues to be large due to the widespread existence of indirect subsidies to the Ukrainian enterprises. The total amount of the subsidies is quite considerable: the share of the direct subsidies declines, while the share of the indirect subsidies grows. Nevertheless, a positive tendency towards a reduction of the total subsidies to the economy can be observed, which may be consistent with the reduced role of the government in a market economy, in which private enterprises perform economic activity and the government is responsible for the delivery of the public goods or services.

Based on the results of my previous research[2], it can be asserted that the most directly subsidized sectors of the Ukrainian economy are agriculture, construction, coal industry, energy sector and transport. The most indirectly subsidized sectors are agriculture, energy, ferrous metals, coal mining and machine building.

Mining and metallurgical complex has a strategic importance for the Ukrainian economy. It consists of about 300 enterprises: 14 enterprises of ferrous metallurgical enterprises, 7 pipe enterprises, 10 wire products enterprises, 16 coke-chemical enterprises, 17 enterprises of refractory products, 26 ore-mining enterprises, 3 ferroalloy enterprises, 20 enterprises of non-ferrous metallurgy and 35 enterprises of processing scrap metal. About 500 thousand workers are employed in the industry. The development of the industry was fostered by the existence of rich raw materials base. Despite its aging technology and the relatively low quality of produced steel, the Ukrainian steel industry plays a significant role in Ukrainian external trade and in the economic growth process at present. Foreign steel producers often accuse the Ukrainian steel producers of being subsidized by the state and, thus, of having unfair advantages. These constant accusations seem to be not quite fair as steel makers in other countries receive government support in different forms as well.

One of the most widely accepted tools for studying government interventions is the partial equilibrium analysis, based on the economic surplus method which is actually a refinement of the cost-benefit analysis, and which measures the distribution of economic benefits between consumers and producers, and welfare gains or losses.

[2] For more detail, see Legeida (2001).

This paper is organized in the following way. Chapter 1 describes the role of the steel industry in the Ukrainian economy, the government support it receives, and gives a brief industry overview. Chapter 2 provides the theoretical and methodological framework for the measurement of the economic impacts of such government policies in general, and for the Ukrainian case in particular. Chapter 3 presents the measurement results for the Ukrainian case, and the resulting implications. The paper ends with conclusions.

Part 1. Role of the steel industry in Ukraine's economy and the government support it receives

A Government support for the steel industry

I. Government support for the steel industry throughout the world

Before describing the government support for the steel sector in Ukraine, it will be worthwhile to look at the government support steel makers receive in other regions throughout the world, in both developed and developing countries. This will help us to evaluate more objectively the cases of the government support for the Ukrainian steel industry and their necessity. International steel trade is distorted now by subsidies, cartels, and various trade restrictions. "One way or another, steel companies around the world benefit from government practices and policies that forestall adjustments mandated by the market. As a result, market forces are not able to bring world capacity and supply in line with demand" (US Department of Commerce 2001). Nevertheless, it has been argued that recently there has been a tendency towards the process of privatization of steel mills and elimination of subsidies all over the world (AIIS 2001). Both US Department of Commerce and EU declare a policy of ensuring fair trade and are against unfair trade practices: dumping and subsidies. Below are some examples of the government support for the steel industry in the world.

USA: Over the past two decades, U.S. steel makers have received government assistance in the form of direct grants, loan guarantees, accelerated depreciation allowances, "tax abatements, interest free loans, infrastructure grants, special electric-power rates, wage allocation to pay off debt service", etc. under different federal, state and local subsidy programs (AIIS 1999). Very often they are granted to the uncompetitive, high-cost producers that have to invest in production modernization. To protect the American steel producers from increasing international competition, two major programs were approved. During 1978-1981 the Trigger Price Mechanism (TMP) 1 was in effect. In 1984 President Reagan approved the Voluntary Restraint Agreement (VRA) that set a limit for steel imports into the USA. Among the most recent examples of the government support are the Program of State Credit Guarantees, approved in 1999, the program of the state support to the noncompetitive steel producers, a great number of lower-level government programs.

Japan: Krugman and Obstfeld (1997) describe in their book the strategic trade policy of Japan. Two stages in Japan's trade policy can be identified. During 1950-early 1970s the government had much influence on the allocation of resources (foreign exchange and credit) and, therefore, the direction of the economy's growth. Since the mid-1970s the government's role has significantly decreased, the major emphasis is being laid on the development of high-technology industries. In the 1950 and 60s the government directed the funds into heavy industries, considering them to be essential for Japan's future competitive advantage. Intermediate goods industries, in particular steel industry, were especially favored. Between 1963 and 1970 steel production in Japan tripled, turning Japan into the largest world steel-exporter. Japan is a resource-poor country and all raw materials have to be imported into the country. By early 1970s Japan had 'the most modern steel plants with lowest operating costs'. The question to answer is whether the resources employed in the steel production could yield a higher payoff to the society if utilized elsewhere, that is, whether the steel sector growth made the whole Japanese economy grow faster. It has been argued that the return from resources directed into the steel sector was not as high as from the resources directed into other production. Capital invested into the steel production yielded a rate of return a bit higher than the average rate of return in Japanese manufacturing during 1960s, and even lower during the 1970s. There existed no important marginal social benefits. Steel industry growth cannot produce large technological externalities, as it is not a high-tech industry. Creation of new jobs cannot be a good argument as Japanese economy was running at full employment at that time. Due to the absence of marginal social benefits, economists argue that the steel support in Japan in spite of its growth was wrong. The resources were not directed to the areas where they could produce a higher return. Japan's case shows that while evaluating the success of a particular strategic trade policy, we should not look at the industry growth rate, or its market share only. Now trade protection in Japan is granted to the sectors with high value added, with a high level of technology, such as, e.g., semiconductor and computer industries, etc. (Howell 1993).

EU: The government supports steel sector in Europe as well. Commercial EU steel industry policy is ruled by the Treaty of Paris (expires on July 23, 2002), which created the European Coal and Steel Community (European Parliament 1998), and the European Community Treaty of Rome (1957). Article 4 of the Treaty of Paris prohibits state support for the steel makers under normal circumstances, but Article 95 allows granting state aid under unforeseen difficulties. The last Steel Aid Code approved in 1996 covers the years 1997-2002. It allows protection measures aimed at social assistance to the workers who lose or change their jobs, at modernization of economic and social infrastructure, etc.

Transition and developing countries: The governments in Russia, Asia and Latin America support steel facilities as well. Steel industry in Poland faces such major problems as overcapacity, over-employment, obsolete equipment (Prus 1998) and receives support in the form of preferential loans, grants from National and Regional Fund for Environmental Protection, commercial loans from foreign banks guaranteed by the Polish government. Government–planned investment projects to introduce new technologies and improve productivity have been undertaken in China (US Department of Commerce 2001), which is the largest crude steel producer in the world.

II. Arguments for the government support for the steel industry in Ukraine

Theoretical arguments in favor of government support comprise assistance to an infant industry, improvement in the terms-of-trade, reduction in unemployment, fairness, income distribution, trade protection, assistance to a developing nation, national safety, defense and correction of the market failure (new protectionism theory, Dickson (1999). Which of these arguments are true for Ukraine? One can enumerate many reasons why Ukraine's Government and Parliament have a particular interest in supporting the ore-mining and metallurgical industries.

Firstly, the domestic economic structure inherited from the Soviet times is one of the determinants. A large reliance on heavy industries: metallurgy, machine-building, etc. is a historical legacy, characterizing the Ukrainian economy. The development of the industry can be, to a large extent, explained by the rich raw materials base and low labor costs. However, Ukraine is poor in energy resources. The share of the ferrous metallurgy production in the total industrial production went up from 11% in 1990 to 27.4% in 2000. More informative, however, are the data on the value added, which better reflects the contribution of the industry to the welfare of the economy. By this measure, metallurgy's share in industry was slightly more than 11% in 2000, while only 5% of GDP is created in the steel industry.

Metallurgical sector is the major exporting industry and, thus, is the major source of the foreign exchange revenues that can allow the National Bank of Ukraine to increase its foreign exchange reserves and the government to make external debt payments. Approximately 40% of the foreign exchange revenues are received from the metallurgical sector.

Secondly, the industry has strong political support and a very strong sectoral lobby consisting of company managers ("red directors"), representatives of sectoral administrative structures, big business associations, and sectoral trade union leaders who all can influence governmental and parliamentary decisions (Foreign and Security Policy of Ukraine 2000). The industry creates a huge field for rent seeking.

Thirdly, the industry is supported for social reasons: a large share of the Ukrainian workforce is employed at metallurgical enterprises and enterprises of other industries whose manufacturing is used for the production of the ferrous metals, e.g., ore mining, or coal-mining enterprises. The production and, thereby, employment are highly concentrated in some regions, which makes the issue of layoffs even more complicated.

And, finally, there is a large involvement of the government in the sector: the government has stakes in almost all plants (though almost all are largely privatized). "Kryvorizhstal" is the largest metallurgical enterprise and is still fully state-owned.

The short run and long run effects of the government support in Ukraine should be differentiated. In the short run the government can achieve the following objectives: overcoming the economic crisis, increasing the exports of the ferrous metallurgy that constitute a large share of GDP and, thus, achieving higher economic growth in the country, solving or easing the problem of the payment crisis and shortage of the working capital of the enterprises, alleviating social problems. However, through the state support the government could never reach the long run objectives, in the first turn, achieving sustainable economic growth, which will help to reach other important objectives. If at present the economic growth depends so much on the ferrous metallurgy growth, then the sustainable growth of the industry becomes important. This growth can be, in the first turn, achieved by increasing the competitiveness of the steel products at international and domestic markets which implies the increase in the production efficiency, deep restructuring of the industry (lowering production costs, increasing the quality of products, widening an array of products). This is slowly implemented now. The achievement of the short run objectives may not always help to reach eventually the long run objectives.

B Brief industry overview

I. Domestic production

Ferrous metals in Ukraine (steel, cast iron, rolled steel, etc.) are largely produced by 14 enterprises. The industry is characterized by economies of scale and the largest 4 enterprises (Kryvorizhstal, Azovstal, Zaporizhstal, Mariupol Illiych) account for a substantial proportion of the industry's output. After the Asian crisis Ukraine's steel industry seems to have recovered and increased its production levels in the 2nd half of 1999 and in 2000.

About 50% of steel in Ukraine is produced by open-hearth method. Although the use of other production methods as continuous casting gained a little since 1999, its application still lags behind the world practice, which is about 80%. At the end of 1999, the depreciation rate of the existing total capital stock for ferrous metallurgy made up 57% and 63% for machinery and equipment. Technological innovations are being slowly implemented; mostly it concerns the largest steel mills. The major sources of the technological innovations are profits and amortization. Domestic credit resources remain unavailable due to high interest rates. Nevertheless, the capital investment index for the ferrous metallurgy shows an increase in capital investment in the recent years: 1997 – 77%, 1998 – 110.2%, 1999 – 100.3%, 2000 – 142.1%.

Due to the old technologies and the decaying capital stock the production is extremely energy-intensive. Energy costs are estimated to be more than 30% of the total production costs. In general, the Ukrainian metallurgy is highly material-intensive and the share of value added in gross production is less than 20%.

One of the major problems of the metallurgical enterprises is the abundance of production capacities. At present the level of capacity utilization varies from 30 to 70%. The usage of the production capacity is below the optimal one, which is about 80%. Reducing the production capacities to a level consistent with external and internal demand was determined to be one of the priorities of the industry development (Grishchenko 2000). Another priority direction is to increase the competitiveness of the products through decreasing energy and raw materials costs, labor costs, infrastructure development, and implementation of major technological innovations.

The profitability of industry is not expected to be high. According to official data, that was true in the mid-nineties, but changed for the better in 1999 and 2000. However, the steel production by open-hearth furnaces was highly loss making in 2000. It should be noted that the data on profits are plagued by several problems and were not reliable in the past. Except for the deficiencies from the (old) bookkeeping methods, profits are highly influenced by subsidies as well as by problems of accounting for amortization.

The labor productivity (expressed in UAH terms) at the metallurgical enterprises that produce ferrous metals almost doubled during 1996-1999. However, it went down if expressed in real terms (deflated by

PPI) and in $ terms: from $ 26477.6 in 1996 to $ 19742.4 in 1999. In an international perspective, labour productivity in the Ukrainian steel industry is extremely low. For example, Brazil with almost identical steel output as Ukraine employs only 15% of the Ukrainian workforce in this sector. While in the EU one-worker produces between 50 – 60 metric tons of crude steel per year, the corresponding figure for Ukraine is less than 15 metric tons.

The viability of any industry depends not only on its production efficiency, especially in the long run, but on the costs of the domestic factors of production, whose rise can significantly lower the profitability of the industry. Major steel industry players actually continuously demand lower prices or tariffs for inputs. Increased tariffs on electricity, transport, etc. contribute to the increase in the expenses that make up the cost value of the steel products.

Basically, primary (iron ore) and secondary (scrap metal) raw materials are used in the steel production. The use of iron-and-steel-scrap instead of cast iron may have contributed to the good performance of the ferrous metallurgy in 2000. The iron-and-cast scrap is an important raw material that can, to a large degree, decrease the cost price of the ton of steel, as the reduced supply of the cast-and-iron scrap leads to additional energy costs and the intensification of the ecological problems.

The transport tariffs for the metallurgical enterprises are much higher than for other sectors and passenger transport due to the effect of the cross-subsidization (Dodonov et al. 2001). The industrial enterprises pay much higher tariffs for transport than they should really pay, while households pay lower tariffs that may not cover the expenses of the transport enterprises.

Metallurgical enterprises are the largest energy consumers. In the early 1990s, they received energy subsidies because of the low energy prices. Now industrial enterprises in Ukraine cross-subsidize households by paying higher electricity tariffs (Dodonov, Opitz, and Pfaffenberger 2001). National Committee on Electricity Regulation (NCER) states that the electricity tariffs for the industry cover long run average costs and are even higher because of the low tariffs for households. Nevertheless, the electricity tariffs for industry in Ukraine are lower than the electricity tariffs in other transition countries[3]. The metallurgical enterprises did not run any new considerable electricity payment arrears in 2000-2001 (there is a decrease in their payables for goods, work and services). They also belong to the enterprises, which perform their settlements for the consumed electricity almost fully in cash, according to the information, provided by the Ministry of Fuel and Energy of Ukraine.

To ensure the steady gas supply has been quite a problem to the metallurgical enterprises. Due to the low level of payments for the gas supplies in the previous years, the enterprises were often disconnected from the gas pipes. The gas supply could be also restricted in winter. Ukraine has to import gas either from Russia or Turkmenistan. "Naftogaz Ukrainy" sets gas prices for industrial customers. Gas prices in Ukraine are distorted in their structure and in nominal terms (Dodonov, Opitz 2001). Tariffs for private households, budget organizations and communal heating enterprises are much lower than for the industrial enterprises. In absolute terms, the gas prices in Ukraine are lower than the gas prices in the neighboring transition economies[4]. The metallurgical enterprises had no debt for the consumed natural gas as of January 1, 2001 according to the information, provided by "Naftogaz Ykrainy".

Low-cost and abundant labor force results in the low share of the production costs on wage payments. According to the US producers, this, together with milder environmental regulations, creates a competitive wedge for the Ukrainian producers at the international markets. Moreover, Ukraine's steel mills have a good position for exports, with an easy access to the Black Sea.

II. Domestic consumption

After the breakdown of the Soviet Union, Ukraine inherited a large complex of mining and metallurgical enterprises (about 35% of the whole USSR industry). The industry, the products of which had been

[3] The electricity tariffs for industry, USD/kWh, in 1999 were 0.0483 in Czech Republic, 0.0550 in Hungary, 0.0369 in Poland, 0.0249 in Ukraine (Dodonov, Opitz, Pfaffenberger 2001).

[4] Gas prices for industrial consumers (USD/tcm, including transportation and distribution costs) in 2000 were 112.0 in Czech Republic, 94.7 in Hungary, 101.9 in Poland, 76.9 in Slovak Republic, 63.3 in Ukraine. The gas price for private consumers in Ukraine was 33.6 in 2000.

mostly consumed by the internal market, had to be reoriented into external markets due to the internal recession.

The share of sales for domestic steel consumption in Ukraine is about 25%[5]. The largest steel consuming countries are, of course, the most developed countries (Compare 20 kg/capita per year in Africa and 635 kg/capita in Japan). However, due to their rapidly growing economies, the largest consumers are Asian countries: Singapore (1200 kg/capita), Taiwan ROC (over 970 kg) and Republic of Korea (830 kg). In 1999 steel consumption per capita in Ukraine amounted to 82.5 kg, which is 5-8 times less than in the developed countries and 1.5 times less than in Russia (Pikovsky 2000). During 1990-1998 internal consumption of ferrous metals decreased from 13.0 m ton to 5.2 m ton per year. Thus, steel production in Ukraine is sustained through exports.

The internal steel market is very slowly being developed. The favorable external conditions put pressure on the domestic market in the form of insufficient supply of ferrous metals to the domestic market and higher steel prices. In 2000 a quite significant increase was observed in the imports of the ferrous metals to Ukraine (by 2.3 times, from 167 thousand tons in 1999 to 385 thousand tons in 2000). Metallurgical production is adjusted to the external market; separate steel products necessary for the internal production, but unpopular at the external markets were stopped to be produced. This is the cost of the today's policy directed at the increase of the exports of the semi-finished steel products and can be treated as a sign of losing the domestic market of final products to foreign competitors.

According to the Ministry of Economy and European Integration information, in the first half of 2001, the domestic steel consumption increased by 7.5-8%. This tendency is expected to be preserved in 2002, the forecast for which is 6.5% growth, and in the subsequent years, while the external demand for steel products is forecast to increase by 1.5-2% in 2001-2002.

III. Trade developments

The external trade activity of the Ukrainian metallurgical enterprises was developing under the influence of the liberalization of exports and imports and trade regulation through indicative prices (Mazur, Ivanov 2000). The enterprises could not compete with less expensive and of higher quality rolled metal of other exporters and were forced to sell products at lowered prices. That resulted in a number of antidumping investigations and resulting financial sanctions. Antidumping was, in the first turn, applied against high-technology steel products, and this may have contributed to Ukrainian steel makers concentrating on the markets of semi-finished products and raw stuff.

According to the Ministry of Economy and European Integration information, since 1992 there have registered 86 cases of antidumping and special investigations. In 60 cases these were investigations concerning metallurgical products. Ukraine is accused of granting state subsidies to the industry, which allow the metallurgical enterprises to produce cheap products. US producers also accuse the metallurgical enterprises of dumping at external markets (selling below market costs), while the Ministry of Industrial Policy of Ukraine argues that the price for the metallurgical products corresponds to their quality.

Ukraine is treated as a non-market economy in the antidumping investigations in many countries, i.e., sanctions are imposed not against particular enterprises that sell their products at dumping prices but against all enterprises of the industry. Dumping is generally discovered by constructing the comparable price, which is calculated under the assumptions of the usual trade conditions for this good, when it is assigned for the sales at the domestic market. The difference between this home price and the export price will constitute the "dumping margin" (TACIS 2001). Due to the non-market character of the economy, where it is perceived that there is significant state control in the economy so that prices and costs can be very distorted, in the antidumping investigations the corresponding authorities can use the country "analogous' to Ukraine (for example, Slovenia or Brazil) to study the cost structure of the steel

[5] According to different sources, the share of exports varies from 70 to 80%. In Russia the internal consumption of the steel production is about 43%. Around 50% of the UK steel production was exported in 1998.

production and resulting prices[6] and to discover the effects of dumping (this method is known as an "analogue country method"). According to economic theory, dumping can be treated as a negative phenomenon only in case it results in stifling competition and market monopolization. Market monopolization cannot be an issue here because Ukraine's market share in the world steel market constituted 4% in 2000 according to the IISI information, though Ukraine belongs to the 10 largest world steel producers. Thus, the argument of unfair competition is of more relevance here. In 2000, only EU and Canada gave to Ukraine the status of a country with a market economy within their antidumping legislation.

The difficult situation of the Ukrainian steel exporters at foreign markets was, to a large extent, influenced by the lack of specialists in external trade, non-participation of the Ukrainian steel producers in any international steel organization, no long-term pricing policy, weak marketing policy, a large number of traders, or intermediaries, who could export the steel to the countries other than those specified in the contract, and the price of steel, of course, varies from region to region.

The volumes of the exports of the ferrous metals went up by 7.8% in 2000, as compared to 1999. Products with low value added (primary goods and semi-finished products) and of low quality predominate in the structure of the Ukrainian steel exports.

Recently the geographical structure of the Ukrainian steel exports has changed significantly. If earlier the major consumers of the Ukrainian ferrous metals were CIS countries, now the major partners are China and "Asian tigers" (although even for these markets Ukraine should fight since they themselves introduce new steel capacities). The exports to the Middle East and South East countries made up about 54% in 2000, thus, the industry is very much dependent on the economic growth in these regions. Half of the steel exports are to 7 countries: China, Russia, Turkey, Taiwan, USA, Italy and Bulgaria. Ukrainian exports to the USA are restricted by the US policy of protectionism, the exports to the North America made up about 9%. The exports to EU countries are also not large (about 7%), as they are also restricted by the EU protectionism policy. The EU is the largest steel producer followed by China, the US, Japan and Russia. In the last years, it reduced its production capacity under EU restructuring policy. This happened simultaneously with increased exports from Eastern European steel-makers, which took up an enlarged share of the EU market.

Ukraine was not the only country that emerged strongly on the world market. Russia, China, and India are also new competitors on the world market. Ukraine has to prove himself in competition against the new as well as the established steel suppliers in the world market. This will likely be a competition over productivity. There is an oversupply of steel capacities in the world and international endeavours strive to reduce the worldwide capacities. Price competition, which currently is backed by plenty of capacities, will in future be much more governed by advances in productivity. Actually, Ukraine is competing on the markets for simple steel products. These products could be exported to the US as well as EU because the domestic production in these regions concentrates on more sophisticated products. This is different to the Ukrainian exports to developing countries, e.g., China, which mainly produce the same product range as the Ukrainian steel firms. Thus, the competition is mainly among the producers of lower quality products.

C Major ways of the soft budget constraints for the steel industry

I. State support (tax subsidies, government guarantees on foreign credits)

Tax subsidies

The practice of granting tax exemptions to individual metallurgical enterprises and restructuring of the budget arrears was widespread in early 1990s.

[6] The so-called 'surrogate' price can also be constructed: the cost of labor – from Brasilia, price for energy – from Turkey, etc. The so-called "natural comparative advantages" can be taken into account while constructing the surrogate value, such as an access to raw materials, or a more efficient production process (TACIS 2001).

The "economic experiment" at metallurgical enterprises

In July 1999, the Parliament of Ukraine approved the Law of Ukraine "On Conducting an Economic Experiment at Ore-mining and Metallurgical Enterprises of Ukraine". The Law is aimed at overcoming a crisis situation in the ore-mining and metallurgical industries, at increasing the volumes of production and government revenues through granting tax privileges. The experiment is slated to be in effect from July 1, 1999 till January 1, 2002. 67 ore-mining and metallurgical enterprises participated originally in the experiment, among which 12 were steel mills.

Article 2 of the Law states that all fines and penalties for the delay in the payment of taxes, fees and other obligatory payments prior to July 1, 1999 will be written off for the participants of the 'experiment'. The fines and penalties on the new arrears accumulated during the 'experiment' period will constitute 50% of the existing rates.

The following tax exemptions were granted:

- **Enterprise profit tax**: participating enterprises have their tax rate set at 30% of the general tax rate. Since the existing general tax rate is 30%, that means that enterprises pay 9% EPT. Savings resulting from the reduction of the EPT rate are meant to be directed towards replenishment of the working capital of these enterprises (lack of the working capital is considered to be one of the major problems of the metallurgical enterprises). These funds are not intended to be directed at other objectives, such as, capital investment, reconstruction or modernization of the production. As of 2001, the participants pay 15% EPT.
- **Roads Fund fee**: zero (Article 3),
- **State Innovation Fund fee**[7]: 50% of the existing tax rate (Article 3),
- **Fee for environmental pollution**: 30% of these revenues are to be directed to budgets of different levels, 70% are to be used by the enterprises for internal environmental protection measures. Sanctions are imposed for the non-targeted usage of funds. The deductions should not exceed 0.15% of the gross expenditures.

Article 4 allows the State Tax Administration of Ukraine to grant deferrals on paying taxes, fees and other obligatory payments to the participants of the experiment for up to 36 months and to impose a zero payment rate for tax credits.

Besides the "economic" experiment, another source of the tax subsidies to the metallurgical enterprises was the accumulation of the arrears to the budgets of different levels (see Table 1).

Government guarantees on foreign credits

At the beginning of the 1990s selected metallurgical enterprises received credits under government's guarantee. As of March 1, 2001, the overdue debt to the state for these credits reached $ 1005,7 m, of which the Makyivskyi metallurgical plant owed 9.3%, and Krivorizhstal – 5.7%.

II. Inter-enterprises soft budget constraints

Payables, a form of trade credit, constitute a part of "soft budget constraints" to the Ukrainian metallurgical enterprises. Arrears are a means of financing enterprise operations and a way of short-term or long-term lending: debts between enterprises tend to decrease transaction costs and increase their sales. Payables for goods, work and services occupy the lion's share of the payables between enterprises, with budget and extra-budgetary arrears following in the structure of payables between enterprises. During the reviewed period of time, a significant reduction of payables can be observed, specifically in 1999-2000, which coincides with the period of the "economic experiment" at the metallurgical enterprises. However, during this period also the recession came to an end so that it is difficult to argue that the "tax experiment" was the main contributor to this reduction. However, the stock of total payables made up

[7] Since January 1, 2000, the Roads Fund fee and the State Innovation Fund fee have been abolished. Therefore, the major tax privilege for the enterprises is the EPT exemption.

UAH 14.3 bn, or 8.3% of GDP, and the stock of total receivables constituted UAH 5.6 bn, or 5.2% as of 01.01.01. Up to 1998, there is a growth in the net total arrears (total payables – total receivables) of the ferrous metallurgy enterprises, in 1999-2000 a decrease is observed.

Table 1. Ukraine: Payables of ferrous metallurgical enterprises (total industry), flow, UAH m

Ferrous metallurgy	1998		1999		2000	
	Total	Overdue	Total	Overdue	Total	Overdue
Total	5019.7	1899.5	600.6	-2163.1	-806.6	-929.6
1. Between enterprises	4600.8	1861.6	226.6	-2137.2	-776.3	-1073.8
Goods, works, services	2353.3	1290.1	-470.8	-826.8	-160.7	-601.2
Wages	114.9	44.8	-96.5	-100.4	-43.4	-93.7
On tax payments	91	14.8	-2,7	8.8	-88.3	-23.6
Budget	670.7	478	-956.8	-740	1.0	-37.3
Extra budgetary funds	173.3	111.7	-342.2	-288.7	-94.2	-48.3
2. With former SU countries	-165.6	-142.7	410.2	10.6	-284.9	-2.4
3. With other countries	-515.6	-347.8	875.4	50.6	39.3	1.6

Source: State Statistics Committee of Ukraine: company accounting balance sheet: form 1b.

Though the government grants indirect support to the metallurgical enterprises, simultaneously, it imposes an indirect tax on them by not returning VAT reimbursement amounts from the budget. One of the negative consequences of this policy is the reduction in the working capital of the enterprises. This problem became especially acute due to the increase in steel exports in 2000. Up to 2000, the arrears of the ferrous metallurgy enterprises on the payments to the budget exceeded the VAT reimbursement arrears (net debtor of the state), however in 2000, the opposite situation was observed: receivables from the budget (UAH 700 m as of 01.01.2001) were larger than payables to the budget (UAH 460 m as of 01.01.01) (net creditor of the state)[8]. The VAT problem was considered as a transitory one and was not taken into account while calculating the amount of the tax production subsidy.

Barter transactions in export and domestic operations were quite frequent during the last years, the greatest share occurring within the domestic market. They significantly went down in 2000: the share of the products supplied through barter arrangements as a percent of the general volume of factory shipments for the ferrous metals (total ferrous metallurgy) went down from 40.8% in 1998 to 9.5% in 2000, much more than for the whole industry of Ukraine. Barter may help to overstate costs and understate value-added. It was used in the past as a means to avoid taxes; it declined substantially with the economic upturn. However, the barter declined more in the steel industry than anywhere else, this reduction, thus, can be related to the "economic experiment" effects.

The following main conclusion can be drawn from reviewing the major channels of the government support and other soft budget constraints for the steel industry. Over time, a certain scenario of the development of different kinds of the government support is observed. In the early 1990s, these are the tax subsidies in the form of individual tax privileges, credits under the government's guarantees and electricity subsidies. In the mid 1990s and up to 1999, these are arrears to the budget and extra-budgetary funds, payables between enterprises and barter operations. Starting with the 2nd half of 1999 the "economic experiment' at the ore-mining and metallurgical enterprises came into force.

8 However, one should be careful about making such conclusions since the major part of the enterprises' receivables from the budget are likely to be the VAT reimbursement arrears and the amount to be reimbursed can be exaggerated due to the weaknesses in VAT administration or fraud.

Part 2. The theoretical and methodological framework for measuring the economic and welfare effects of government policies

A General issues

A broad subsidy concept is often used to cover the whole range of the on- and off- budget measures:

- Direct budget expenditures,
- Tax subsidies: tax credits, exemptions, deferrals, restructuring or forgiveness of debt, public provision of goods and services, preferential loans, etc.
- Domestic policies: price supports, etc.
- Trade policies: import and export tariffs, non-tariff barriers.

These subsidies are recognized by the Agreement on Subsidies and Countervailing Measures (Subsidies Agreement of WTO) and US Law. The Subsidies Agreement provides the rules for the use of the government subsidies and gives remedies against subsidized trade. Actions can be taken only against specific subsidies, i.e., those given to one company, or a special group of subsidies.

According to the System of National Accounts definition (OECD 1997), "subsidies on production are grants which state and private enterprises receive from the government and which represent additions to the receipts of producers of goods and services over and above what they receive from the sales of their output". These grants will not constitute a part of the market value of the output; nevertheless, they can offset the part of the production costs. Production subsidies include subsidies on products, which are paid for each unit of good or service produced and cover import subsidies and export subsidies. Domestic production subsidies are based on the output or production, irrespectively of where it is sold. They may be specified as an ad-valorem subsidy (% of the value of the production) or specific (payment per unit of output). Generally production subsidies are given to increase the incomes of the producers of a particular industry (in many countries are granted for agricultural commodities to raise the incomes of the agricultural producers) or to stimulate the production of a particular good (often granted for steel, motor vehicles, etc.). Subsidies may be used to support the industries, important for economic growth.

To study the effects of subsidies (price effect, demand effect, production effect, export effect, net welfare effects, etc.), the partial equilibrium analysis is often used. The graphical analysis may be useful for capturing the welfare effects of distortions of consumer and producer behavior.

B Case of Ukraine

In this paper, the standard microeconomic approach to measuring different economic and welfare effects of government interventions is applied, based on the application example by Rosenberg et al. (1999) for the case of Uzbekistan. Their approach used the simple partial equilibrium analysis to study the effects of exchange rate controls for the exports of cotton fiber and the effects of appreciated exchange rates for the imports of capital goods. A simple graphical and numerical analysis was employed to derive the welfare effects, based on the implicit subsidy, or tax rate and export supply elasticity, or import demand elasticity.

The prime objective of the economic experiment at ore-mining and metallurgical enterprises is to increase total production. Therefore, the government subsidy reducing the EPT rate to 30% of the existing general tax rate can be treated as an ad-valorem production subsidy. The subsidy increases the working capital of the subsidized enterprises and lowers the effective cost of producing each unit by s. However, this production subsidy is meant to be a special production subsidy, which is a kind of the implicit export subsidy, since Ukrainian metallurgical enterprises export the major part of its production.

Actually, two factors, that determined the growth in the exports of the ferrous metals in 1999-2000, could be pointed out: increase in the world demand for steel, which created favorable conditions for the Ukrainian steel exporters, and "economic experiment" at the metallurgical enterprises.

Only the effects of this ad-valorem EPT subsidy will be looked at, holding everything else constant and assuming no other market distortions, or imperfections. In Figures 1 and 2 the price, quantity and welfare effects of the government tax subsidy to the metallurgical enterprises are illustrated.

I. Small country assumption

Let us assume a small open economy with a perfectly competitive industry. This assumption implies horizontal, or elastic export demand function in the rest of the world.

Figure 1 presents a graphical analysis of the Ukrainian steel market (right-hand part of the figure: S^{Ukr} – Ukrainian steel supply curve, D^{Ukr} – Ukrainian steel demand curve) and of the rest of the world steel market (left-hand quadrant: X^{Ukr} - Ukrainian steel exports supply function, D^{RoW} – demand function for Ukrainian steel exports).

With "small country assumption" we mean that domestic policies do not affect the world price of the commodity under investigation.

Without the subsidy, the following situation is at the markets: oc is the world price of steel, cf – domestic steel production, ce – domestic steel consumption, ef = bc – quantity of the Ukrainian steel exports. The tax subsidy pivots the supply function of Ukrainian steel producers from S^{Ukr} to S^{Ukr}_{subs} by the amount of the ad-valorem subsidy s ($p_s = p_{ws}(1+s)$), where p_s- price under subsidy, p_{ws} – price without subsidy. The export supply function pivots from X^{Ukr} to X^{Ukr}_{subs}. Exports increase to ki = ml = ac. Under the small-country assumption, the domestic policy will not affect the world price of the good. The domestic price and consumption are also unaffected. These are the economic impacts of the subsidy. To evaluate the welfare consequences, the concepts of producer and consumer surpluses are applied.

The net social welfare can be calculated as the sum of these surpluses minus the government tax subsidy. Producers gain as a result of the subsidy: Δ PS (producer surplus) = + lifc. Consumer surplus (Δ CS) does not change. The government grants the subsidy in the following amount: tax subsidy (TS) = - lijc. Net welfare effect = PS + CS - TS = + lifc – lijc = - ijf = - mba.

These triangles represent net deadweight losses (the so-called Harberger triangles) that measure the degree of the inefficiency of the government policy, inefficiency in resource allocation as subsidy distorts incentives to consume and produce. For the mathematical derivation of the net welfare loss, log-linear export supply function for the ferrous metals is assumed:

$P^X = B \times X^{\beta}$, where $\beta>0$ (1)

The elasticity of the export supply is:

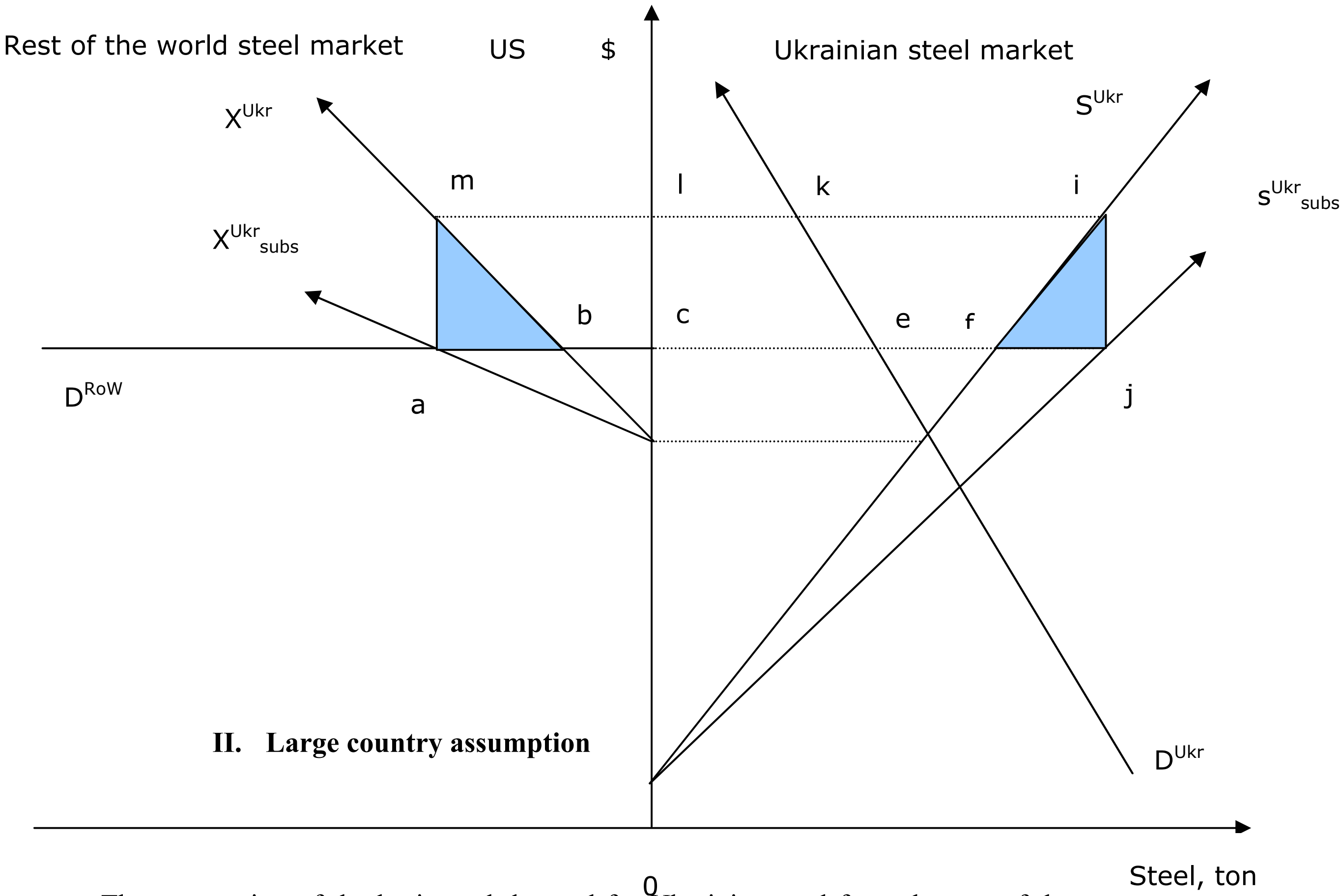
$$E_X = \frac{dX}{dP_X} \times \frac{P^X}{X} = 1/\beta \quad (2)$$

The derived analytical expression (its derivation and necessary explanations are presented in Appendix 1) for the net welfare losses is:

$$NDL = \frac{\beta}{1+\beta} \times P_S \times X_S \times \left(1 - \left(\frac{1}{(1+s)^{1/\beta}} \right)^{1+\beta} \right) - s \times X_s \qquad (3)$$

Thus, as can be seen from the equation (3), in order to calculate the deadweight losses, subsidy rate (s), price elasticity (β), steel price under subsidy (P_s), and the quantity of the steel export supply under subsidy (X_s) are needed.

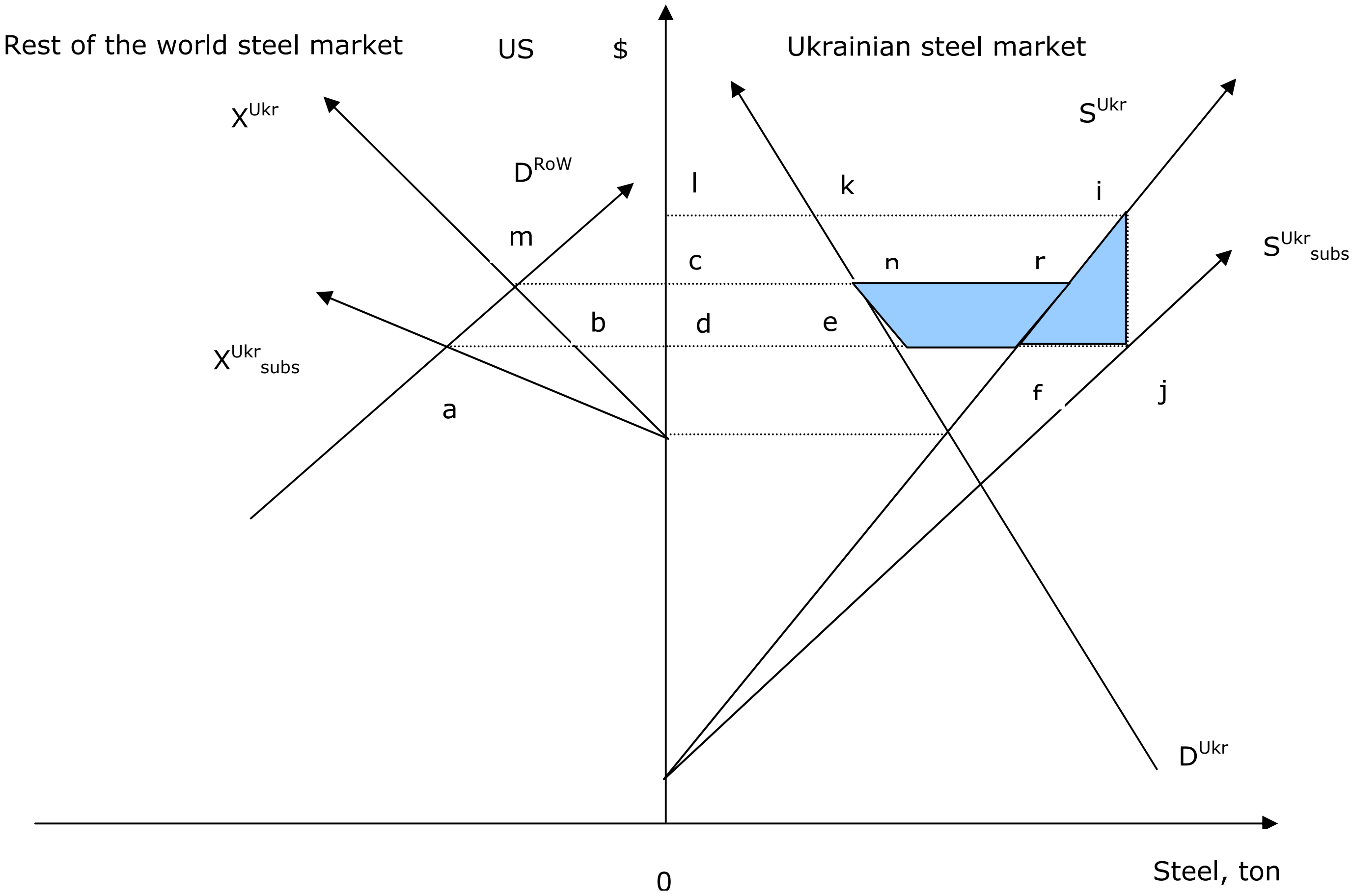
Figure 1. Effects of a production tax subsidy to steel producers (small-country assumption)



The assumption of the horizontal demand for Ukrainian steel from the rest of the world may seem not quite correct due to the large influence of the Ukrainian steel producers at international markets: Ukraine took up the 7th place among the major crude steel-producing countries in 1999, its 4 major steel-producing companies are among the 60 largest steel producing companies in the world, its share in the steel world exports in 1998 made up approximately 7%, or 6th place among world largest exporters (www.worldsteel.org). Nevertheless, Ukraine cannot be argued to have large monopolistic power at the international markets. According to the IISI, Ukraine's world market share in 2000 made up 4%. The export of Ukrainian products is constrained by the protectionism policies of foreign governments: anti-dumping duties, quota restrictions, prohibitive import tariffs, etc. The reduction of Ukrainian exports can be easily replaced by the exports from other countries, which increased their production during the recent years, and now world steel supply exceeds world steel demand. Nevertheless, the large country assumption may be useful so as to provide a sensitivity analysis of different welfare effects under various assumptions.

A "large-country assumption" implies that exports of the country constitute a large share of the world steel market. Thus, the production tax subsidy will affect supply and demand and, hence, welfare, both, domestically and internationally. Such a subsidy leads to the expansion of the country's exports and to a slight increase in the domestic consumption of the good. This case is presented in Figure 2.

Figure 2. Effects of a production tax subsidy to steel producers (large-country assumption)



Without the subsidy, oc is the world price of steel, cr is the quantity of the steel produced in Ukraine, of which cn is consumed at home and nr = mc is exported. As a result of the subsidy, the production amount rises to li = dj, the supply function pivots from S^{Ukr} to $S^{Ukr}{}_{subs}$ by the amount of the ad-valorem subsidy s. The export supply pivots from X^{Ukr} to $X^{Ukr}{}_{subs}$ but by less than the amount of the subsidy, since the production amount increase is distributed between the internal and external markets. Therefore, the exports rise from nr to ej = ad, and the domestic consumption rises from cn to de, caused by the market price decrease from oc to od. The subsidy results in higher prices for producers (ol) and in lower prices for consumers (od), both for the domestic and foreign ones.

The welfare effects can be illustrated in the following way: TS = lijd – the amount of the government subsidy, Δ PS = + lirc – producers gain as a result of the subsidy, Δ CS = + cned – consumers gain as a result of the subsidy, the net welfare effects = CS + PS – TS = - lijd + lirc + cned = nrfe + ijf. The triangle ijf is the deadweight loss, or the resource waste. The welfare loss in the form of nrfe is the loss due to the terms of trade deterioration, i.e., it is a redistribution of the welfare from Ukraine (exporting country) to the rest of the world, since the foreign customers now pay less for their imports.

The deadweight loss in the amount of the triangle ijf can be found in the similar way to the small-country assumption (assuming the same constant elasticity function for the steel supply function in Ukraine, as for the export supply function: $P^X = B \times X^\beta$, $\beta > 0$):

$$\underbrace{NDL}_{ijf} = \frac{\beta}{1+\beta} \times P_s \times X_s \times \left(1 - \left(\frac{1}{(1+s)^{1/\beta}}\right)^{1+\beta}\right) - s \times X_s \qquad (4),$$

where β - price elasticity of the supply, s – ad-valorem subsidy, P_s – price received by producers under subsidy, X_s – domestic steel production under subsidy.

The derivation of the trapezoid nrfe (welfare loss due to the terms of trade deterioration (WL)) is presented in Appendix 2:

$$\underbrace{WL}_{nrfe} = P_{BS} \times \frac{1}{(1+s)^{1/\beta}} \times \left(\frac{\beta}{1+\beta}\right) - \frac{P_C}{2} \quad (5),$$

where P_{BS} – steel price before subsidy, P_C – price to steel consumers under the subsidy.

The same elasticity is used in both cases since Ukrainian supply of the ferrous metals is actually almost equal to the exports of the ferrous metals.

Part 3. Estimation of the results for the Ukrainian case

A Results of the experiment

There are different points of view concerning the success of the experiment at ore-mining and metallurgical enterprises. It goes without saying that the experiment benefited the steel makers, which resulted in the improvement of the production and financial indicators of the enterprises. However, the overall economic upswing in the country and favorable external conditions should not be underestimated here.

According to the Accounting Chamber of Ukraine, the given tax privileges created favorable climate for overcoming the crisis situation at the ore-mining and metallurgical enterprises. The major objective of the experiment was achieved: participants increased the volumes of their production (real production growth made up 20.3%), sales, and their payments to the budget and Pension Fund. Payments for energy and natural gas also grew. The participants of the experiment were exempted from paying taxes, fees and other obligatory payments on the amount of UAH 2013 m in the 2nd half of 1999 and in 2000. Besides, UAH 714.9 m in fines and penalties was written off, UAH 1919.2 m in the budget payments was restructured. The widening of the tax base contributed to the increase in the amount of the budget payments and tax privileges. However, the lowering of the tax burden for the metallurgical enterprises implies that it has been automatically increased for other industries or sectors of the economy. The number of the workers at the enterprises-participants went up by 12 thousand, average wages increased by 28.2%. It may be treated as a short-run benefit as a result of lowering social tension. That shows that even passive restructuring (reduction of the production facilities in response to the changed demand, reduction of the inefficiencies through lay offs of workers) that usually precedes strategic changes, was not properly applied. And in fact as it has been mentioned above, the real labor productivity has gone down.

Notwithstanding some positive changes, the analysis discovered that the production growth was not sustainable; as, to a great extent, it was rather dependent on external market conditions, not on the growing internal demand, which resulted in the slowing down of the production rates and profitability by the end of the year. These factors are likely to contribute to slower industry growth rates in the subsequent years. There were also no significant and sufficient structural changes in the work of the enterprises.

The Ministry of Economy and European Integration has presented a brief analysis of the effects on the production and on the financial and economic activity of all enterprises participating in the experiment, comparing 2000 to 1999 (See Table 2). The results of the experiment are presented for all participating ore-mining and metallurgical enterprises together. Since data for the metallurgical enterprises only are not available, we have to assume that the overall trends will hold true for the metallurgical enterprises too.

Table 2. Ukraine: Results of the economic experiment at ore-mining and metallurgical enterprises, 2000 compared to 1999

Net profits from sales	↑ by 57.2 %
Export volumes	↑ by 1.9 times
Profitability (profit/output) of sold products	26.3 %
Barter operations	↓ from 36.1% in 1999 to 11.1% in 2000
Government revenue at all levels	↑ by 48.2%
Payments to the Pension Fund	↑ by 52.2%
Wage arrears	↓ by more than 2 times
Expenses for improving production capacities	↑ by 25.4%
Deficit of the working capital	↓ from UAH 3452 m as of 01.01.2000 to UAH 596 m as of 01.01.2001

Source: Dzerkalo ekonomichnoi politiky, March 2001. Department for Economic Strategy, Ministry of Economy and European Integration.

Enterprises managed to overcome the working capital deficit, refused from give-and-take schemes, barter operations and started to reinvest. It added more transparency to the transactions within ferrous metals production and reduced the number of intermediaries. However, an audit, conducted by the Accounting Chamber, showed some violations: not all enterprises made payments to the government in a timely fashion and followed the law requirements. Many enterprises could direct the funds, freed from the reduction of the EPT rate, not at the replenishment of the working capital.

B Estimation of the net welfare effects

The tax exemption subsidy may not constitute a part of the market value of the output but can help offset a part of the production costs. The statistics available at this time concerning the results of the experiment at ore-mining and metallurgical enterprises presents the aggregate data on the amount of the tax privileges and writing-off or restructuring of the tax arrears for the enterprises participating in the experiment. As this paper concentrates on the steel enterprises only, and since disaggregated data is not available, the most appropriate way to calculate the subsidy amount is to take the data on the before-taxed profits of the enterprises and simply calculate the amount of the tax exemptions by reducing the EPT rate from 30% to 9%:

Subsidy amount = 21% of the before-taxed profits[9] *of the metallurgical enterprises.*

Under this assumption, the total amount of the government subsidy to the metallurgical enterprises amounts roughly to about UAH 700 m, or USD 130 m. The ad-valorem subsidy rate equals s=2.6%.

Since the estimation of the export steel supply function for Ukraine and, respectively, of the necessary export supply elasticity is complicated due to the data reliability and availability, the existing research on this issue was reviewed in order to obtain a reasonable range of the steel export supply elasticities to estimate the welfare effects.

In the economic research, most of the import and export elasticities have been derived from the demand side. Very few studies estimate export supply elasticities, using both single equation models and

[9] International standards of bookkeeping accounting should have been introduced at Ukrainian enterprises since January 1, 2000. This is the attempt to bring into agreement the bookkeeping and tax accounting. The difference between the two can be explained by two factors: 1) method of accounting, 2) the definition of gross revenues and expenditures. According to general standards, accounting income should form the basis for the taxation income. In this case, to get the amount of the subsidy, the financial result of the enterprises before taxation was used.

simultaneous equations models (Goldstein and Khan 1978). The theoretical approach in the demand-side studies is to assume that the export supply is perfectly elastic.

Based on the estimation of the inverse supply of US iron and steel products, the following elasticity estimates were obtained: the price elasticity of demand for US exports was –2.7, the elasticity of the export supply for the USA amounted to 16.7 (Irwin 2000).

In the studies of the effects of the US-Canada Free Trade Agreement (conducted by the Mount Union College in the USA), the export price elasticity for steel-mill products was estimated to be 5.2.

Unfortunately, there exist very few studies on the ferrous metals in Ukraine. According to one of the studies available (Grygorenko 2001), the price elasticity of the export supply of the Ukrainian steel constitutes 0.1.

To calculate the deadweight losses, formulas (3-5) are now being used. The price resulting under subsidy program is based on the weighted average price for the Ukrainian steel. The export price elasticities estimated in other studies are applied here, to perform a sensitivity analysis of the welfare losses to export supply price elasticity. In general, many partial equilibrium and computable general equilibrium models that estimate deadweight losses from different trade policies, rely on demand and supply elasticities obtained in other studies (Feenstra 1992). Table 3 presents the results of the calculations. As can be seen, the estimated welfare losses amount to between $ 0.1 and 14 m under the small-country assumption and to between $ 0.1 and 15 m under the large-country assumption. In the worst case, the excess burden per dollar of the subsidy payment is $ 0.11 under the small-country assumption, and $ 0.12 under the large-country assumption.

Table 3. Ukraine: Net welfare effects from the EPT subsidy in 2000 (small-country and large-country assumptions)

β	*1/β*	***Welfare losses, m, USD (small-country)***	**Welfare losses, m, USD (large-country)**
0.1	10	-13.67	-15.19
5.2	0.2	-0.29	-0.32
16.7	0.1	-0.08	-0.1

C Interpretation of the received results

The production tax subsidy is distortionary in its character and welfare reducing. However, the deadweight losses turned out to be rather low under both assumptions, the result which is characteristic for many similar studies. The welfare losses rise with the elasticity of the export supply of the ferrous metals and depend on, whether the country is modeled as a small or large economy: under the large-country assumption, the welfare losses would be larger.

Many research studies show that subsidies failed to achieve their primary objective. In this case, the subsidy seems to have reached its primary objective, as specified in the Law, i.e., raising the supply of the ferrous metals and improving the financial situation of the enterprises so as to reduce payment arrears. However, the significant structural changes did not occur.

The cost of the subsidy is borne by the government in the form of the foregone state revenues (notwithstanding the overall growth in the budget payments), while the benefits are shared between producers, steel mill workers and suppliers. Foreign steel consumers also benefited from the government policy in Ukraine, while foreign steel producers are likely to have suffered from it.

Nevertheless, one should be careful about concurring with the estimate's low welfare losses resulting from the government support. They are calculated for 2000 only and could be much higher if other distortions in the steel market were taken into account, in particular before 1999.

First of all, the amount of the subsidies to the steel mills could be higher, taking into account enterprises' payables and the amount of the other tax exemptions.

Ferrous metals are one of the most energy-intensive industries of the Ukrainian economy, and this issue has several negative characteristics. First, earlier metallurgical enterprises accumulated large energy arrears and were against the compulsory disconnection from the energy supplies. Non-payments for energy led in their turn to the non-payments of the energy sector enterprises to the budget. Second, the energy-intensive production implies high demand for the energy production. Ukraine cannot satisfy its demand for energy with its own production and is dependent on the import of energy resources and gas from Russia or other countries. The non-payments for these supplies lead consequently to the accumulation of state or corporate gas debt before Russia or Turkmenistan in the previous years. Though electricity tariffs and gas prices have grown up considerably during the transition period for the metallurgical enterprises, they are still below world market prices, which may create a competitive wedge for the Ukrainian producers at external steel trade markets. However, the data for 2000 and 2001 shows that the metallurgical enterprises made almost full and timely payments for the consumed gas and energy, although, there were exceptions.

Secondly, the subsidies may cause substantial efficiency losses due to less well-managed enterprises. The subsidy may cause enterprise managers to concentrate less on profit maximization, and, hence, optimization of the production process as they can always account on the government support. On the other hand, the owners may be interested in receiving 'quick' profits, not caring much about the enterprise restructuring. Weak management (lacking private management expertise), poor marketing strategies, resulting in inadequate pricing strategy, could be possible explanations of such a large number of antidumping investigations conducted against Ukrainian steel producers. Thus, the estimated welfare losses could be the lower bound estimates due to the adverse effects of subsidies on the enterprises' behavior.

Thirdly, the resource waste costs (from mis-used scarce resources due to price distortions, most products exported are primary goods, or half-finished products) and environmental costs, which may become especially burdensome in the future, should be taken into account.

Besides, the quantitative analysis concentrated on the short-run effects. In the long run, the negative effects of the government subsidies can appear much larger. Currently, the government subsidy results above all in the expansion of export supply, implying an increasing dependence on external steel market developments. This dependence may become a danger to the metallurgical enterprises when, having invested a lot into the expansion of the production and updating production capacities, they will not be able to sell their production externally, and the internal market will fail to absorb the increased amount of the production. In such a way, the government may solve its present urgent problems and put off the real solution of the problem into the future and harm future sustainable economic development and increase social tension. International evidence shows that steel industries in many EU countries have to undertake measures that resulted in the cutting down of the level of the employment at the steel mills. Thus, the protection of the sectoral employment may not be a good argument for the industry protection. However, if the present economic growth appears to be sustainable, the growing production in other sectors of the economy may, to some extent, solve the problem of the employment and future industry importance.

The above discussion of the effects from the subsidies shows that the removal of the subsidies, though painful, could lead to fiscal, economic and environmental gains.

The applied partial equilibrium analysis did not capture the effects of the subsidy on other sectors of the economy. The study of these effects would require a general equilibrium analysis.

Conclusions and policy implications

Different sources of the governmental support for the steel industry and their sequence were reviewed in the paper. Special emphasis was laid on studying fiscal and economic implications of the tax exemptions, provided by the "economic experiment" at the metallurgical enterprises. The effects of the ad-valorem subsidy in the form of the EPT reduction from 30% to 9% were carefully studied. The partial equilibrium analysis allowed us to estimate roughly the implications for the major players at the steel market: steel consumers and steel producers. However, the economic implications for the whole economy, as well as environmental and energy implications, were not totally captured.

It is difficult to evaluate the amount of the subsidies exactly, due to the non-transparency in the 'experiment' results and information on individual enterprises. More transparency could allow more exact estimation of the impacts, costs and distributive implications of the subsidies.

The production tax subsidy is distortionary in its nature and is welfare-reducing. Tax burden should be reduced for the whole economy, not just for specific industries or sectors of the economy. Each subsidy is provided at somebody's expense. The "economic experiment" may have contributed to an improved financial situation of the enterprises; the threat of being excluded from the experiment may have provided incentives to work better. But these can be short-term improvements, as deep structural changes did not occur, and to a large extent it may be explained by less efficient management who may not be interested in doing restructuring knowing that they can be bail-out by the state in case of emergency.

The experiment should be viewed as a temporary one-time measure of the government support that helped the enterprises to overcome the crisis situation in the industry, after which the enterprises should rely on their own resources, which will improve their economic efficiency and ensure competition both externally and internally. The world experience shows that government protection cannot create a competitive industry. This is observed in Ukraine now. That is why; the demanded prolongation of the experiment should be prohibited.

There should be fair relations between the state and the metallurgical enterprises. Though the government supports the industry through tax exemptions, simultaneously it imposes an indirect tax in the form of the budget arrears on VAT reimbursement. Besides, the eligibility of the enterprises for VAT reimbursement from the budget should be checked due to a lot of violations associated with VAT refund. However, these problems should not be solved through mutual settlement schemes.

The investigation concentrated on the short-run effects of the subsidies, which should be contrasted with their long-run effects. The long-run effects would appear to be more detrimental, especially, in case the internal market for steel is not developed and the dependency on the external market is predominant. At the present world market, there is a supply-demand imbalance, supply exceeds demand and that drives world prices down. The question arises, whether it is worthwhile to invest large amounts of money into re-newing production capacities. To ease the dependence, the greater emphasis should be put on the development of the domestic market for steel, which, first of all, implies the development of the machine building, construction, and transport. Ukraine's situation in the world is complicated due to the transition non-market character of the economy. Antidumping investigations are likely to continue, economic growth in the major exporting regions for Ukraine may decrease, and, thus, Ukraine should exploit and develop the internal market. The reform in the tax system, reduction in the regulatory burden (the decrease of a number of various inspections) could do much good in this regard. Therefore, the internal market for steel industry products may seem to be the major determinant for the industry growth and prosperity in the long run. The internal determinants of the industry growth on the supply side are also important. The increase in the tariffs for electricity and gas prices can threaten future industry performance and industry competitiveness.

Subsidy reform in the steel industry is sure to be opposed by the vested interests, this is actually the situation, observed now, when the metallurgical enterprises insist on the continuation of the experiment and demand increases in the amount of the enterprises eligible for participation. In case of the studied subsidies to the steel industry, the benefits are more clearly seen to the public than the costs, which are distributed across the whole economy. And, on the other hand, the costs of removing the subsidies are more visible than the benefits from getting rid of them.

As for the future research agenda, steel export supply and total steel supply modeling and elasticity estimation should receive more attention. That could allow determining the true determinants of the industry growth, differentiating between the positive effects from the "economic experiment" and favorable external conditions on the industry's growth and hypothesizing what industry's development might have been without the "experiment", assuming a high world demand for the Ukrainian steel. We admit the deficiencies of our calculations. However, this work provides the first attempt to estimate the welfare costs of the government support to the Ukrainian steel industry.

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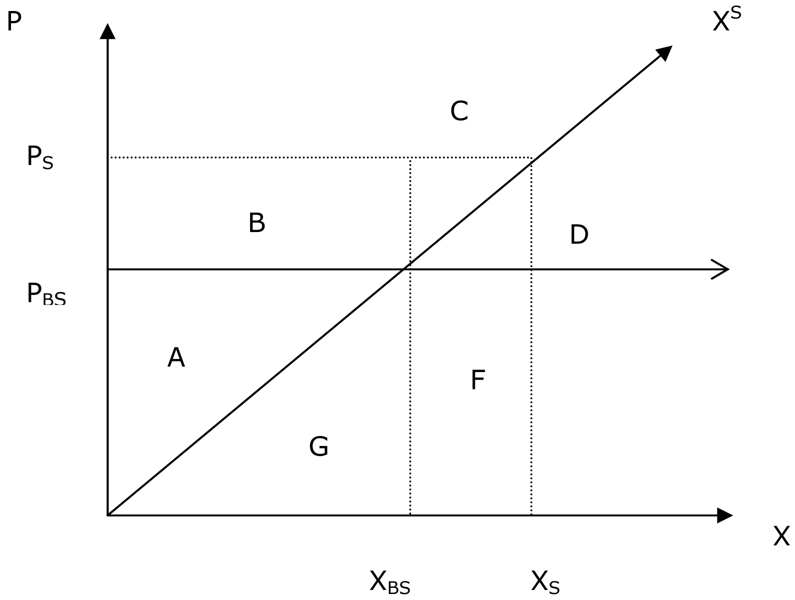
Appendixes

Appendix 1. Small country assumption

For the mathematical derivation, it is convenient to use the simplified picture of the Ukrainian export market. It is presented at the picture below:



where X^S is the export supply function, P_S – steel price under subsidy, P_{BS} – steel price before subsidy, X_{BS} – steel export supply before subsidy, X_S – steel export supply under subsidy.

The net welfare loss at the picture is equal to the figure D (corresponds to the triangle mab at Figure 1). To derive it, we apply integral calculus to find the square of the necessary triangle. The analytical expression for the net welfare losses is:

$$\underbrace{NDL}_{D} = \left\{ \left[\underbrace{P_s \times X_s - B \times \int_0^{Xs} X^\beta \times dX}_{A+B+C+D+F+G-D-F-G} \right] - \left[\underbrace{P_{bs} \times X_{bs} - B \times \int_0^{Xbs} \times X^\beta \times dX}_{A+G-G} \right] \right\} - \underbrace{s \times X_S}_{B+C+D} =$$

$$= \left\{ \left[P_S \times X_S - \frac{B}{1+\beta} \times X_S^{1+\beta} \right] - \left[P_{BS} \times X_{BS} - \frac{B}{1+\beta} \times X_{bs}^{1+\beta} \right] \right\} - s \times X_S =$$

$$= B \times X_S^\beta \times X_s - B \times \frac{X_S^{\beta+1}}{\beta+1} - B \times X_{BS}^\beta \times X_{BS} + + B \times \frac{X_{BS}^{\beta+1}}{\beta+1} - s \times X_S =$$

$$= B \times X_S^{\beta+1} - B \times \frac{X_S^{\beta+1}}{\beta+1} - B \times X_{BS}^{\beta+1} + B \times \frac{X_{BS}^{\beta+1}}{\beta+1} - s \times X_S =$$

$$= B \times X_S^{\beta+1} \times (1 - \frac{1}{\beta+1}) - B \times X_{BS}^{\beta+1} \times (1 - \frac{1}{1+\beta}) - s \times X_S =$$

$$= \frac{B \times \beta}{1+\beta} \times (X_S^{\beta+1} - X_{BS}^{\beta+1}) - s \times X_S =$$

$$= \frac{B \times \beta}{1+\beta} \times X_S^{\beta+1} \left[1 - \frac{X_{BS}^{\beta+1}}{X_S^{\beta+1}} \right] - s \times X_S =$$

$$= \frac{B \times \beta}{1+\beta} \times X_S^{\beta+1} \times \left(1 - \left(\frac{X_{BS}}{X_S} \right)^{\beta+1} \right) - s \times X_S \qquad (1)$$

From the export supply function, the following expression may be obtained:

$$\frac{X_{BS}}{X_S} = \left(\frac{P_{BS}}{P_S} \right)^{1/\beta} = \frac{P_{BS}^{1/\beta}}{\left(P_{BS}(1+s)\right)^{1/\beta}} = \frac{P_{BS}^{1/\beta}}{P_{BS}^{1/\beta}} \times \frac{1}{(1+s)^{1+\beta}} = \frac{1}{(1+s)^{1/\beta}} \qquad (2)$$

and

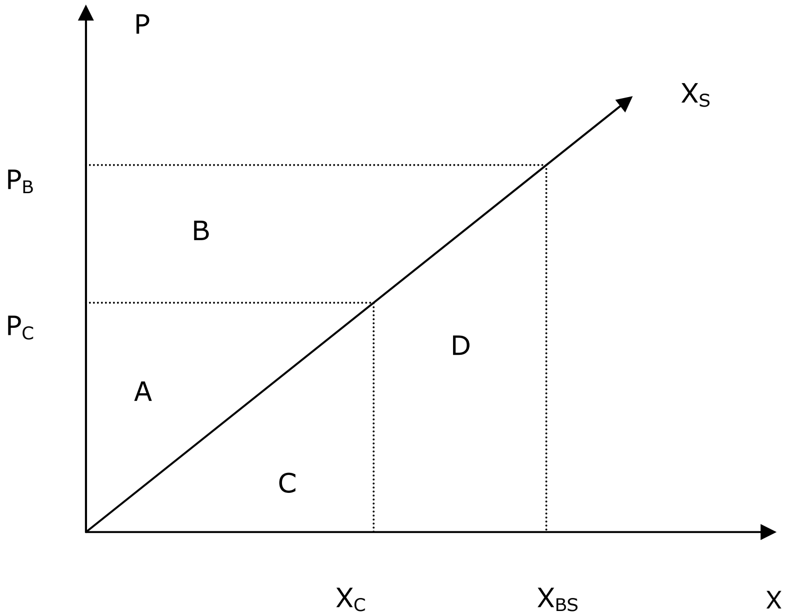
$$B \times X_S^{\beta+1} = B \times_S^\beta \times X_S = P_S \times X_S \qquad (3)$$

By substituting (2) and (3) into (1), we obtain the following expression used for the calculations in the text:

$$NDL = \frac{\beta}{1+\beta} \times P_S \times X_S \left(1 - \left(\frac{1}{(1+s)^{1/\beta}} \right)^{1+\beta} \right) - s \times X_s \qquad (4)$$

Appendix 2. Large-country assumption

To calculate the amount of the area B at this picture (corresponds to the trapezoid nrfe at Figure 2), we look again at the export market:



where X^S is the export supply function, P_{BS} – steel price before subsidy, X_{BS} – steel export supply before subsidy, P_C – steel price to consumers, X_C – steel export supply bought by consumers.

The net welfare loss at the above picture is equal to area B.

$$\underbrace{NDL}_{B} = \underbrace{P_{BS} \times X_{BS}}_{a+b+c+d} - \underbrace{B \times \int_0^{X_{BS}} X^{\beta} \times dX}_{c+d} - \underbrace{\frac{1}{2} \times P_C \times X_C}_{a} =$$

$$= P_{BS} \times X_{BS} - B \times \frac{X_{BS}^{1+\beta}}{1+\beta} - \frac{1}{2} \times P_C \times X_C = P_{BS} \times X_{BS} - \frac{B \times X_{BS}^{\beta} \times X_{BS}}{1+\beta} - \frac{1}{2} \times P_C \times X_C =$$

$$= P_{BS} \times X_{BS} - \frac{P_{BS} \times X_{BS}}{1+\beta} - \frac{1}{2} \times P_C \times X_C = P_{BS} \times X_{BS} \times \left(1 - \frac{1}{1+\beta}\right) - \frac{1}{2} \times P_C \times X_C = \quad (5)$$

$$= P_{BS} \times \frac{X_{BS}}{X_C} \times \left(1 - \frac{1}{1+\beta}\right) - \frac{P_C}{2} =$$

$$= P_{BS} \times \frac{1}{(1+s)^{1/\beta}} \times \left(\frac{\beta}{1+\beta}\right) - \frac{P_C}{2}$$