DETERMINANTS OF
PRIVATIZATION PRICES. THE
CASE OF UKRAINE.

by

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Abstract

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This research studies the determinants of the privatization prices. The focus is on the factors which affect the Ukrainian privatization. Internal political (much controversy), geo-political (Ukraine is in the middle of attention of the European Union, USA and Russia), the investment attractiveness of Ukrainian enterprises and other reasons make the Ukrainian privatization sample, interesting to analyze. This research is the first to analyze the determinants of privatization prices in Ukraine. We use a cross-industry sample of 173 large and medium privatization cases, which took place during the period 1998-2004. A log-linear model is applied. Explanatory factors are grouped in the following categories: company specific characteristics, labor factors and dummy variables such as time dummies, industry dummies, geographical appurtenance of the buyer dummies and cash flow and voting rights dummies. Investors are found to care much about the power over the entity they buy. Fixed Assets and Net Sales increase the privatization price, and the Short Term Liabilities decrease them. Moreover we conclude that the privatization prices depend non-linearly on the company specific factors. The Number of Workers factor has a small positive effect on the price.

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GLOSSARY

IFG. Industrial Financial Group.

NGR. Net Government Revenue.

SOE. State Owned Enterprise.

IPO. Initial Public Offering

INTRODUCTION

The privatization process in a former socialist country is usually associated with a transition period the country is experiencing. Most of the times the transition in the framework of which the privatization is considered is the one from a central planned economy to a market one, like in the countries of former USSR and Central and Eastern Europe. What we observed in those countries were massive privatization programs with different strategies, velocities, and efficiency. Another framework of transition in which privatization might happen is the change of political regime in already developed countries i.e. coming to power of more liberal leaders. The process of privatization can be regarded as a huge reallocation of public assets, an outflow of business power from the state to certain groups of people – the shareholders. It is a benefic phenomenon, from one side because of considerable proceeds to the state budget, from another due to an outbreak of investment activity (Okten and Arin n.d.) into the newly acquired enterprises, which stimulates growth of the economy.

Different countries pursue very different goals when privatizing enterprises. Those goals to a great extent depend on the political maturity (commitment) of the country leaders. Some of the countries incepted the privatization programs in order to conform to the requirements of international organizations like the IMF, the World Bank, etc, for receiving foreign assistance. Other countries relied heavily on privatization in order to revive their dying economies, showing the will to adhere to the principles of a market economy and to position themselves as steadily growing economies. A very demonstrative example of such a country is the Czech Republic which is currently one of the leading transition countries in Europe. The third type of

political regimes regards privatization more as a source of personal enrichment and is involved to a higher degree in the privatization process. This is the case of Russia, Ukraine and some Asian countries - former USSR republics. What can often be observed in those countries is that strategic enterprises are sold to the financial-industrial groups, domestic as well as the foreign ones, close to a number of people leading the country (case of Krivorizhstali).

The more distanced is a country from the former USSR frontiers the higher is the political will of the politicians to reanimate the country and the lesser personal interests are involved in such economic processes as privatization. This phenomenon is greatly explained by the degree of remoteness from the former USSR and its influence is felt less and less the farther one goes to Europe. Kopstein and Reilly (2000) provide evidence of this phenomenon. And probably this would be one of the explanatory factors of such a big difference in the speed of development between former communist countries in Central and Eastern Europe and the former USSR republics. In the former, cases when the government inserts their own interest in privatization are rare compared to the post soviet republics in which we even became used to the fact that many enterprises are controlled by business groups close to the country leaders.

The Ukrainian privatization is characterized by a certain degree of controversy especially the privatization of big and the medium firms. Ukraine is a strategic country politically and economically, having a huge agricultural and industrial potential as well as transportation networks. Both the European Union and the Russian Federation are interested in acquiring stakes in the perspective Ukrainian enterprises. Firstly, Ukraine has a significant debt to Russia and the Russian authorities have repeatedly declared (for instance Mr. Kasianov-former prime minister of the Russian Federation) that they would be willing to swap a part of the debt for the equity in Ukrainian enterprises. Secondly

there is a good portion of the natural gas and oil pipelines going from Russia to the EU through Ukraine. The interest of the Russian private sector in this industry of Ukraine is obvious; it already has controlling shareholding in many oil refinery plants in Ukraine (Odesa Refinery Plant, Lisichansk Refinery Plant, etc.). A significant presence of the Russian capital is observed in other industries of Ukraine as well, for instance the dairy products sector, mobile telecommunications sector and others. From another side, Ukraine wishes to join the EU and become a member of the WTO, therefore it has to conform to the requirements set forth by these organizations. So one of the goals of the Ukrainian policy makers would be to stimulate the FDI which are fairly small (according to the statistics of Derjcomstat) compared to other transition countries. Therefore Ukraine really has to find a balancing position between all these factors. In the described conditions of an interesting geo-political situation it is interesting to observe the process of privatization and the process of pricing the sold entities. Usually a privatization competition has several stages. First the participant must conform to several requirements and then he is admitted further. There were cases when proposals from world industry leaders, offering a higher price were rejected because they did not fulfill these controversial requirements. The most vivid example is the case of Krivorizhstali, when the plant was sold to an IFG one of the co-owners of which being the son in law of the president of Ukraine. Disqualified remained several world recognized bidders, which offered much more.

Therefore what we intend to do in this research is to see what determines the privatization prices in Ukraine, whether those are some company specific features, industry factors, or something else. One of the most interesting questions is whether the geographical appurtenance of the buyers matter for privatization price. Expectedly geography should matter due to geopolitical situation of Ukraine (West vs. East). This reason as well as the fact that Ukraine is among world leaders in a number of industries (iron ore, etc), makes the Ukrainian sample a very interesting one to analyze. Factors

influencing the privatization prices in Ukraine were not analyzed before. Most of the research done around the world was in the framework of labor factors. This research makes more stress on company specific factors and the characteristics of the privatized stake.

The analyzed data sample consists of 173 large and medium privatizations from different industries occurred during 1998-2004 period. This is the most representative period of the Ukrainian privatization because the lion's share of large and medium privatization happened exactly during these years. The majority of entities of this size are targeted by the foreign investors and the domestic IFGs.

Main findings consist in the fact that the investors care a lot about the power over the entity they are acquiring. Fixed Assets and Revenues (Net Sales) are found to influence positively the privatization prices and the Short Term Liabilities – negatively. The marginal effect of Fixed Assets and Net Sales on the prices is declining proving a non linear relationship. Generally the industry dummies are insignificant however they have a great explanatory power proven by the test of joint significance. The price for a domestic buyer is shown to be lower compared to a western one.

The structure of this thesis is as follows: chapter 2 presents a literature review on the topic, chapter 3 describes the data, chapter 4 introduces the reader to the methodology used, chapter 5 presents the results and discussions of the regression analysis and chapter 6 concludes.

LITERATURE REVIEW

The topic of privatization is subject to more and more research and the literature related to it is growing rather fast. There even was done a literature survey on the papers written on this subject, which I consider a corner stone review in the domain of privatization and namely Megginson and Netter (2001). To provide a general context to my research we will start this review with a number of papers that focus on different aspects of privatization.

The research papers analyzing different aspects of privatization can be generally divided in several groups. The question to what extent the government should interfere in the economic processes of a country remains open for discussion. It is generally agreed that privately owned enterprises perform better than the state owned ones (Boubakri and Cosset (1998), Sabirianova, Svejnar, Terell (2004), etc). One of the major examples in support to this statement was the USSR. Seemingly they were doing great, with high rates of development, stable macroeconomic situation, etc. But the system collapsed, and one of the reasons was that the USSR's planned economy was maximizing the output disregarding the costs (Krugman (1994)), which was not efficient. The capitalist economies resort to more liberal market set ups, with lower degrees of government interference, letting the businesses to do business. Thus a major strand of literature is dedicated to the efficiency analysis of the enterprises before and after privatization. The second category deals with the ownership issues of the privatized entities. However the subject of efficiency and ownership are strongly related one to the other. Many researchers claim that one of the most significant determinants of the efficiency improvement is exactly the change in ownership, and the papers, which evidence this fact will be described later.

We do not aim to separate exactly the pure efficiency from ownership studies because the majority of them consider those two topics together. The third group of researchers tries to asses the degrees of government involvement in the privatization process across countries. The role and the goals which governments pursue at different stages of privatization are controversial. The method of sale of state owned enterprises, which is chosen by the government according to different characteristics of the firms, is a big area of research.

We will start with a paper which compares the efficiencies of the state owned entities and private owned entities in a very interesting and specific way. Karpoff (2001) assesses the efficiency of those two categories by examining a rather unique life experiment and namely the arctic expeditions which were to locate the North Pole and discover several arctic regions. The data sample which he took as a basis for analysis comprised 35 government-funded and 57 private-funded expeditions over the period 1818-1909. In his regression analysis Karpoff used a set of indicators like the number of major discoveries, crew deaths, ships lost, tonnage of ships lost, incidence of sea diseases like scurvy, level of expedition accomplishment including a dummy for private expeditions and state expeditions. Also he controlled for such factors as the country of origin of the expedition, previous experience of the expedition leaders, the decade in which the expedition occurred or the exploratory objectives. He showed that basically in each expedition the private ones performed better. He also stressed that private expeditions made more discoveries and had lower degrees of human losses, concluding that private organized expeditions were based on stronger incentives.

What is interesting to see is that the privatized firms perform differently, depending for example on the ownership structure, compared to the state owned ones. Sabirianova, Svejnar and Terell (2004), in their paper answer the question of whether the transition economies are catching up with the world

standard or not. The authors base their research on a 1992-2000 years range data comprising 1000 Czech firms and 16000 firms from Russia. The approach adopted to answer the research question was to compare the productive efficiencies among three types of domestic firms: state owned enterprises (SOE), private enterprise, mixed owned ones and foreign owned firms. Sabirianova, Svejnar and Terell (2004) claim that both countries had similar initial conditions but the privatization itself took place in a rather different fashion. The striving of the Czech Republic to access the European Union helped them to create an articulate market economy open to FDI and trade with proper legal and political institutions. Russia however failed to do that selling most of their entities to domestic owners remaining relatively closed to FDI and thus to world standards. The main finding was that there are differences between the best private firms and the best foreign firms and the worst private and foreign ones in favor of the foreign entities. Moreover the gap is much larger between the best ones than the worst ones. The explanation of this phenomenon lies generally in two reasons: first, foreign investors might buy better domestic firms and second, foreign firms might be more likely to move up the ranks of efficiency from one year to the next whereas domestic are more likely to remain at the same level or decline in ranks (Sabirianova, Svejnar and Terell (2004)).

Many studies have shown the performance improvement of privatized firms in developed as well as in developing countries. A representative survey is done by Dewenter and Malaesta (1997). They describe the history of privatization in such developed countries as Canada, France, Japan etc, and developing ones such as Hungary, Poland etc. Each country had its own goals when incepting privatization but the relevant fact being that in all of them entities started to perform better on average. The same evidence provide Megginson, Nash and van Randenborgh (1994); Boubakri and Cosset (1998); D'Souza and Megginson (1999); and others. An earlier study of Boubakri and Cosset (1998) has shown on the basis of a sample of 79 firms from 21

countries privatized between 1980 and 1992 that the operating and financial performance has increased. A consequent study in this vein Boubakri, Cosset and Guedhami (2001), is analyzing the factors which cause the performance improvement in greater detail. They go beyond the facts documented by Megginson, Nash and van Randenborgh (1994); Boubakri and Cosset (1998), etc, and namely that entities' performance varies with the level of country development and the market structure. Boubakri, Cosset and Guedhami (2001) took a sample of 189 newly privatized firms from 32 developing countries and tried to determine the factors which provoke performance improvement. The uniqueness of the paper comparing to earlier ones such as D'Souza, Megginson and Nash (2000), Shirley (1999) consist in the fact that the authors are controlling for such variables as specific characteristics of the countries like trade liberalization policy, the level of institutional development, etc. The main result found by the authors is that the performance varies with economic reforms like liberalization, environment and general corporate variables like the involvement of the foreign investors in the ownership structure.

A different measure of performance efficiency has been used by Choi and Nam (2000). Taking a sample of 185 privatization initial public offerings (PIPO) of SOE in 30 countries during 1981 – 1997 they compare the returns on them to the returns on initial public offering of privately owned enterprises. An important conclusion which they make is that in total the privatization initial public offerings are considerably under priced comparing to the IPO of the privately owned entities. An obvious reason for that consists in the fact that much higher degree of uncertainty is associated with the state owned enterprises and according to Choi and Nam:" public ownership weakens the relationships between marginal utility and firm profit and thereby adversely affects the efficiency of the firm". However other possible explanations exist. First, governments on purpose sell with a discount, stakes in entities. Second, after being privatized they continue to

hold considerable portions in the ownership of the enterprises, which contributes to confer uncertainty to their further developments. Those findings were documented as well by Jenkinson and Mayer (1988) and Menyah and Paudyal (1996) analyzing the situation in United Kingdom.

However Steen, Kalev and Turpie (n.d.) seriously criticize the findings of Choi and Nam on the example of Australian entities, which were included in the sample that Choi and Nam used, basically reporting that the difference between the returns is much larger than reported by Choi and Nam. Steen, Kalev and Turpie (n.d.) claim that the study made by Choi and Nam has a large selection bias and that they did not account for many specific factors like industry and company feature. However the general conclusion that privatization IPOs are under priced compared to private sector IPOs holds.

Konings, Van Cayseele and Warzynski (2002) use another approach. On a sample of 1701 Bulgarian and 2047 Romanian manufacturing firms they try to asses market power reflected in price-cost margins and see how it is influenced by privatization. The authors point out that state owned enterprises have lower margins and give two explanations for this phenomenon. One being that usually state owned enterprises are less efficient than the private ones and they have higher cost, the second is that the government is trying to maximize social welfare and thus sets somewhat lower prices. In the market economy optimization by the government of the social welfare generally loses its sense (except for in the health care, education and other) because of market liberalization, increased private ownership and competition. It is rather easy to check whether the government sets lower prices or has higher cost, by doing simple comparison of prices charged by both categories or of costs that they have. And the results obtained by Konings, Van Cayseele and Warzynski (2002) are quiet in line with what was exposed, however they accept the fact that the government is concerned with the social welfare. They found that private firms have higher margins than the

state owned ones highlighting the fact that the entities with foreign ownership have even higher margins.

Jones and Mygind (1998) come to the same conclusions which made a study of the ownership of the privatized firms in the Baltic countries. But the way they do it is quite different. Gathering a sample of 1500 privatized firms they dive in the ownership analysis of the 3 countries distinguishing between insider ownership and outsider ownership. Through the prism of this analysis they consider different aspects of entities' activity controlling for appurtenance to industries and country specifics, they came (among other results) to a rather expected conclusion that companies are more efficient (with different degrees among the 3 countries) with outside ownership.

So far we have been looking at the studies relating to the efficiency and ownership, next we turn to the role of the government involvement in the privatization process. The government proved itself to be a not very good corporate manager; however this does not mean that it behaves irrationally when privatizing entities. Gupta, Ham, and Svejnar (2001) suggest that governments adopt certain strategies when privatizing enterprises, and one of the most widely used is the so called sequencing. The authors in their research based on the information for the Czech Republic basically test the hypothesis whether the government pursues the following objectives when privatizing entities: maximizing efficiency through resource allocation, minimizing political costs, maximizing privatization revenues, maximizing public goodwill from the free transfers of shares to the public and maximizing efficiency through information gains. First, what they found is that the government privatizes profitable firms first, which is the evidence to the fact of maximizing public goodwill and revenue as well as to increase efficiency through informational gain, a fact which was documented by Glaeser and Scheinkman (1996) as well. However the hypothesis that the government

increases the Pareto efficiency through improved resource allocation and the one that it minimizes the political costs are inconsistent.

The privatization process in Ukraine until now has not benefited from the same attention which was paid to this process in other countries, meaning that there is not much research done on this; probably because the process is relatively young compared to other countries. There is a relatively early (for privatization in Ukraine) paper by Snelbecker (1995) on the political economy of the privatization in Ukraine. It analyses several mistakes (in the opinion of the author) done by the authorities in the matter of privatization. The major mistakes Snelbecker considers were: 1. the government from the beginning adopted a "go slow" approach, privatizations were basically done on a case by case basis; 2. when the authorities realized that it doesn't work they adopted a mass privatization plan, which also proved to be inefficient the way it was done. The author concludes that the government should develop and implement sound auction, policy and legislative tools to stimulate an efficient privatization.

The research papers appeared gradually with the need for serious changes in different problematic situations in sectors of economy. For instance a descriptive paper by Bondar and Lilje (2002) addresses the issue of land privatization in Ukraine. The authors consider different aspects of the land privatization like the underlying legislation, different multilateral land projects with participation of foreign countries, etc. The conclusions that the authors make have a recommendation character. They state that the legislation should be improved, that there must be a political commitment to establish grounds and to undertake administrative actions; that the banking system should install a proper mortgage system in order the privatization of land to succeed.

More attention has been dedicated to the question of efficiency improvement of the privatized entities and what are the reasons for it. Andreyeva and Dean

(n.d.) provide evidence that in Ukraine the privatization itself does not lead to efficiency improvement. Significant is the post-privatization ownership structure. They claim that ownership concentrated private entities perform better than the ownership diluted, which in their turn outperform the state owned enterprises, everything else equal. The research is based on the labor productivity analysis of 190 Ukrainian entities.

There is no disagreement that the private ownership positively influences the firm performance in Ukraine. A recent paper by Grygorenko and Lutz (2004) analyzees the labor productivity efficiency like Andreyeva and Dean (n.d.), but they use different explanatory variables. The analysis of 466 Ukrainian Joint-Stock Companies shows a positive relationship between labor productivity and increased competition after the privatization. They also found that the majority state ownership indicates a significantly worse performance, however despite that; they evidence a truly controversial result and namely the performance seems to increase with the percentage of state ownership. The soundest explanation brought by the authors is that state ownership provides business ties, which facilitates the performance. Similar conclusions makes Warszynski (2003) who shows that ownership (because of the disciplining effect) and competition positively influence the performance of the privatized entities in Ukraine.

The influence of the ownership effect on the privatized entities in Ukraine is fairly exploited. Melnychenko and Ernst (2002) use a rather interesting approach. They develop an "agency problem index" from one side, and see whether it has an influence on the performance of the privatized entities; from another side, they asses the impact of privatization in transition economies on the productivity and efficiency. Their findings are generally consistent with the conclusions made by other authors and namely that the enterprise performance declines with the increasing level of state ownership

and that the performance improves with the lower incidence of the agency problem.

Finally Wood (2004) shows that private ownership brings gains to the society in the case when it has strong institutional framework like in the already developed countries, which is not the case in many transition economies.

The papers that we have discussed until now have no direct relationship to the questions we are going to address in my study. However we consider that it is necessary in order to give the reader a general understanding of the topic.

The goal of this research is to see what determines the privatization prices in Ukraine. There are several studies for other countries completed on this topic. A rather similar (by methodology but different by target privatization group and by the method of privatization – sale through auctions and further resale on the secondary market - stock exchanges) research was done by Claessens (1995). This early paper focuses on the voucher privatization (mass privatization) prices in Czech and Slovak Republics (more than 1469 observations). The author uses as the dependent variable 3 types of prices: the bids from the 5th round (last round), and the trading prices for two different stock exchange systems (Prague Stock Exchange and the Czech RM-system). Ownership variables, firm data (output, profit, credit, employment, book value of equity, etc), concentration, etc are used as explanatory variables. The dependent variable is in logarithms because of 1) fat-tailed distribution of raw data and 2) in order to convert shares per point (1 right) to prices in currency equivalent. Claessens finds that concentrated ownership and high absolute ownership have positive effects on prices. Domestic ownership has a higher positive effect on the price than the foreign however the state ownership has a negative effect on the price. Firm specific factors like profits have a positive influence on the price and the employment and surprisingly book value a negative one.

Claessens (1995) is a logical continuation to the research conducted by Shafik (1994b). Here the stress is on the influence of the stepwise revelation of the information on the bids in consecutive rounds during the mass privatization auction in the Czech and Slovak Republics. OLS technique is applied on a sample of 1491 observations. First the author runs 4 regressions for each of the rounds and shows the declining effect of the company specific factors on the price and the increasing importance of the relative price information and the lagged price. The explanation is that this information is absorbed by the next bid. In the 4th round according to the author the equilibrium emerges and those prices are used to determine the prices in the 5th - last round. Then the author tries to find the determinants of the equilibrium price levels, the dependent variable being the price in the 5th round defined as shares per number of points (rights). The book value, employment characteristics and appurtenance to Slovakia (more industrialized than the Czech Republic) have a positive influence on the price. Profit per output and participation of the foreign investor influence negatively the prices. The author mentions that the log model has greater explanatory power.

A relevant study on privatization prices was done by Lopez-de-Silanes (1996), who analyzed 361 privatized Mexican companies. The author puts in the base of the study the idea that the government's main objective in privatization is to generate revenues. As the dependent variable Lopez-de-Silanes had the so called "Privatization Q" calculated as the net government price (present value of the price stipulated in the sale contract) adjusted for total assets, total debt and the size of the stake sold. Explanatory variables were divided in 3 categories: company performance and industry parameters, auction process and requirements and prior restructuring made by the government. He documented that the price of privatization negatively depends on the degree of strength of the labor unions. That labor restructuring, for instance the firing of the CEO increases the price of the companies. Generally labor factors and industry characteristics like costs and have a significant impact on

the price. Profitability of the companies has a positive influence on the price. If foreign investors are allowed to participate the price increases. Costs of prior restructuring policies are also shown to be positively related to the privatization price. Similar research was conducted by Arin and Okten (2003) on the basis of 68 privatized firms in Turkey. The authors provide evidence that the revenues and the market characteristics of the entity are significant for the price determination while current cost and profit indicators are not. The state owned enterprises are considered to be inefficient therefore their cost structure and profits are irrelevant. A significant importance has the unexploited capacity, and the complete private ownership. Somewhat different approach use Chong and Galdo (2003), who have taken a sample of 84 telecommunication enterprises across several countries (which was not done before) to analyze the factors which determine the privatization prices. Their findings are consistent to those of Lopez-de-Silanes (1996) and Arin and Okten (2003). A research, which focuses on the influence of the labor restructuring measures prior to privatization on the privatization prices, is performed by Chong and Lopez-de-Silanes in 2002. A cross-country analysis on 400 observations shows that in general there is no significant impact of labor retrenchment (for instance) and other restructuring policies on the privatization prices.

My research focuses on the influence of company specific characteristics, peculiarities of the privatized stake and geographical appurtenance of the participants on the privatization prices. Using a sample of 173 cross-industry observations on Ukrainian privatization we will check the findings of previous researches and maybe reveal new results

C h a p t e r   3

DATA

The data set used in this research was constructed on the basis of the information provided by the State Property Fund of Ukraine (SPFU) upon a formal request. It consists of 190 privatization cases representing mainly medium and large sales of State Owned Enterprises (SOE), which occurred in the period starting with 1998 till October 1994. The information provided by the State Property Fund of Ukraine was the following: the name of the privatized entity, the privatization price, the stake in the sold entity and the name of the entity which bought (privatized the proposed enterprise). All the privatized entities were open joint stock companies (OJSC) and that's probably why those enterprises are medium and large ones. Afterwards several electronic public sources were used to obtain the second part of the data – the explanatory variables. The web sites: www.istock.com.ua and www.corporation.com.ua provide the financial information for almost all open joint stock companies registered in Ukraine. Labor related data was provided by the State Statistics Committee of Ukraine. Table 3.1 presents the definitions and expected influence on the privatization price. Table 3.2 presents descriptive statistics of the variables.

Table 3.1. Definition of the variables.

Variable	Description	Expected Effect
Company Specific Factors		
FA	Fixed Assets at the beginning of the year in which the privatization took place	Positive
TA	Total Assets at the beginning of the year in which the privatization took place, which is also an approximation of market share and capacity.	Positive
NW	Net Worth (shareholders' equity) at the beginning of the year in which the privatization took place	Positive
NP	Net Profit at the beginning of the year in which the privatization took place	Positive

SBD	Senior Bank Debt (long term bank credits) at the beginning of the year in which the privatization took place	Negative
OLTFL	Other Long-Term Financial Liabilities (corporate bonds issued, long term advances received, other borrowings, etc) at the beginning of the year in which the privatization took place	Negative
LTL	Long-Term Liabilities at the beginning of the year in which the privatization took place	Negative
STL	Short-Term Liabilities at the beginning of the year in which the privatization took place	Negative
NS	Net Sales at the beginning of the year in which the privatization took place	Positive
CS	Cost of Sales at the beginning of the year in which the privatization took place. The figures are negative in the dataset.	Negative
Depth	Percentage of stake privatized	Positive
GM	Gross Margin – the difference between Net Sales and the Cost of Sales	Positive
Labor Related Factors		
Workers	Number of employees at the beginning of the year in which the privatization took place	Negative
Productivity_NS	NS divided by the number of workers (net sales productivity)	Positive
Productivity_NP	NP divided by the number of workers (net profit productivity)	Positive
Cap_Intens	FA divided by the number of workers (capital intensity)	Positive
NW_Per_Labor	NW divided by the number of workers	Positive
CS_per_Worker	CS divided by the number of workers	Negative
Time Dummies	Dummies for 7 years, 1 if the privatization occurred in the corresponding year and zero otherwise.	Ambiguous
Cash flow and voting rights dummies	Dummies for cash flow and voting rights categories, 1 if the stake corresponds to a certain category and zero otherwise. More details are given in the main text.	Positive
Geographical appurtenance dummies	Dummies for geographical appurtenance of the buyer, 1 if the buyer belongs to a certain category and zero otherwise. More details are given in the main text	Ambiguous
Industry dummies	Industry dummy variables, equal to one if the privatized entity belongs to a certain industry and zero otherwise. More details are given in the main text.	Ambiguous

Table 3.2. Descriptive statistics of the variables

Variable	Min	Max	Mean	St. Deviation
ln of Price	9.418086	20.34104	14.92469	2.177472
Price	12309	682000000	23100000	69700000
FA	56573	754000000	87600000	131000000

TA	192115	1790000000	173000000	282000000
NW	-21000000	911000000	87500000	139000000
NP	-69100000	90100000	-1720738	17600000
SBD	0	211000000	3874699	22600000
OLTFL	0	126000000	2293216	11500000
LTL	0	211000000	10500000	28100000
STL	0	1550000000	734000000	171000000
NS	0	1310000000	103000000	192000000
CS	-1180000000	5080000000	-8590000000	163000000
Workers	16	24492	2728.601	4136.179
Depth	0.12	0.9931	0.4329852	0.2103258
Capital Intensity	852.7626	9822375	158499.1	1064175
NW per Labor	-91499.51	9582583	161674.9	1040972
NP Productivity	-2309958	21873.26	-30037.2	248427.5
NS Productivity	0	3837292	107521.5	510294.6
CS per Worker	-4902959	34735.13	-111912.8	590568

The balance sheets and the income statements i.e. the financials of the enterprises belong to the group of explanatory variables classified as Company Specific information. 17 observations were lost due to partial availability or complete unavailability of the financial information.

The data set was built observation by observation. As generally known the yearly financial statements present figures for the beginning of the reporting period (end of the previous period) and for the end of the reporting period (beginning of the next period). To each privatization price in the sample correspond financials registered immediately prior to the moment when privatization happened. For example if an entity was privatized in year 2000 the financials used for this observation were for the beginning of the year 2000 or end of 1999. For the majority of cases this was the principle of construction. However in several cases due to unavailability of data the figures were taken for previous periods (several periods before), for instance if the entity was privatized in 1999 the data used was for 1998 or 1997. And still there were several exceptions: for a couple of privatization cases the data used were registered right after the privatization took place. In our analysis we will check whether these observations are influential. This is because the figures used were taken right after the privatization and its impact could not be felt yet, as well as because the sample was augmented by this number of observations. This principle of construction avoided one of the main

problems – endogeneity. All the company specific variables were inflation adjusted to the base year 1998. This procedure is logically necessary in order to "bring the sample to the same denominator", to get rid of the inflationary noise which can spoil the estimations.

As previously mentioned the first group of variables represents the financials. There are 12 variables which are classified to this group. The second group is represented by labor data. The initial principle is preserved. We took the number of workers and respectively their productivities and other labor related variables (see tables 3.1 and 3.2) at the beginning of the year for each privatization case.

The third group that we use represents four sets of dummy variables: (1) industry dummies, (2) year dummies, (3) dummy variables set for geographical appurtenance of the winner in the privatization contest and (4) voting and cash flow rights dummies of the privatized stake and. The industry breakdown of my sample is the following: 16 enterprises belong to the energy generating sector (oblenergos); there are 21 enterprises belonging to the mining industry (iron ore and coal mining); 28 enterprises belong to the metals manufacturing industry; 10 enterprises in the construction industry; 36 enterprises in the machine building industry; 16 enterprises in the chemistry industry; 11 enterprises in the oil and gas industry; 3 enterprises in the food industry; 5 enterprises in the trade industry; 9 enterprises in the paper and textile industry; 9 enterprises in the transportation industry; 6 enterprises in the car industry; 3 enterprises in the tourism industry and 1 insurance company (finance). For each of these industries were created dummy variables to capture the difference between sectors of economy.

The second group of dummies is time (year dummies). The purpose of having them in the regression analysis is to capture the difference between mentioned time periods.

According to the geographical feature we classified the winners in the privatization contests (the actual buyers) in three categories: (a) entities which are registered in Ukraine so domestic entities – they constitute the majority –

139 cases, (b) the ones which countries of origination are situated in Europe or Northern America or Western companies (my sample does not contain acquisitions by companies which originate from Asia or other region of the world not mentioned above except for one case in which an entity was bought by a citizen of Lebanon whom we also classified to the west) – 31 cases, and (c) companies which are registered in Russian Federation or other countries from the Commonwealth of the Independent States or Eastern companies – 3 cases. The motivation and the reason for such a classification is the following: We expect that there is certain difference in the pricing distribution between the domestic winners and the foreign ones, because one might expect that some government officials to be biased towards certain categories of investors. Especially it is interesting to see how the West differs from the East. However there is a problem with the western companies. One third of them are off shore companies most probably owned by domestic Industrial Financial Groups (IFG) or by eastern (Russian companies). So the question is to what category these off shores should be classified. One option would be to put them to the group of western companies because it is difficult to distinguish which one is owned by a domestic IFG, a Russian company or a foreign investor (there are cases like that). The second option is to include a separate dummy for the off shores. The second approach will allow to see whether there is any difference between western companies and off shores ones from one side and the difference between off shores and the domestic from another.

The fourth group of dummy variables is intended to see whether certain blocks of shares have influence on the privatization price. The classification was done according to 4 groups of blocks: 1) 25% of shares or less (38 observations), 2) range between 25% + 1 share and 50% (73 observations), 3) range between 50% + 1 share and 75% (39 observations) and 4) range between 75% +1 share and 100% (23 observations). All those categories have different cash flow and voting rights, or better to say if all of them are common shares (and they are) then they have the same voting rights but

different cash flow rights, however obviously different sizes of the stakes have different voting power. Also according to the Law of Ukraine on joint-stock companies a 25% +1 block of shares has a blocking right, so anyone who owns 25% +1 can block certain decisions taken on the general shareholder's meeting. A block of 60% of shares is a quorum. So everything what is higher than 60% is an extremely powerful block of shares. Therefore there is sense to include in the analysis another set of CFVR dummies and namely: 1) < 25%; 2) 25% + 1 share – 50%; 3) 50 + 1 share – 60% - 1 share and 4) 60% - 100%. This set up will allow to analyze the influence of the CFVR from a slightly different point of view.

Lopez-de-Silanes (1996) uses a much more complete set of explanatory variables allowing for a deeper analysis. A great part of the data used by Lopez-de-Silanes is just not available due Ukrainian specifics of information disclosure and physical absence of such data. However Lopez-de-Silanes makes more stress on analyzing the influence of such factors as labor specifics, restructuring prior to privatization and a lot of qualitative variables (for instance the level of bureaucracy of the manager of the privatized company, or whether the manager was fired prior to privatization or not etc) than the company characteristics.

Other authors like Chong and Galdo (2003) or Arin and Okten (2003) use much smaller number of explanatory variables stressing the analysis on labor data company and industry specifics.

It is necessary to say that compared to similar researches my sample lacks important explanatory variables, namely the number of bidders in the privatization contest and whether it was an auction or a contest. However there are explanations for that. Regarding the second issue – my sample contains only contests. As for the first one – the specifics of Ukrainian privatization consist in the fact that in a number of cases there was only one bidder admitted to the final stage of the tender, all others were rejected at earlier stages. The conditions for admissions where set in each case

individually in order to draw out of the competition unfavorable investors (for instance in many cases the foreign ones like in the case of Krivorizhstali). And accordingly the admitted one was entitled as the owner. There are opinions that this is one of the strategies of the Mr. Kuchma regime to favor certain IFGs and people who are behind them and to eliminate from the competition participants who potentially might have bided a higher price (http://www.ord.com.ua/categ_1/article_14323.html). This is the case of the heavy industry enterprises (metals, mining, machine building), for the rest of privatization cases the data on the number of participants is not available. It would be good to have it in the regression analysis in order to test whether the findings of other authors for other countries are applicable to Ukraine, for instance that the privatization price is an increasing function of the number of participants in the contest (Lopez-de-Silanes (1996) and others).

As mentioned before the data set was constructed that way in order to avoid the endogeneity. Another problem which should be taken into consideration is the heteroskedasticity. The distributions of the error terms of the explanatory variables in the sample may follow different patterns. The t-statistics will be wrongly calculated; therefore no conclusion about the significance of the coefficients can be made. Therefore in order to check for heteroskedasticity the White Heteroskedasticity test will be performed and if there is heteroskedasticity the method of robust standard errors will be applied. However expectedly, due to the log-linear model used (which will be described later) the problem of heteroskedasticity should be weakened.

Another relevant problem of the explanatory variables is that they are colinear. Due to the nature of the data a good part of the variables are strongly correlated, which confuses and makes it difficult to make conclusions about the results. In Appendix 0 can be seen how many correlating variables there are in the sample (shadowed). It is natural that total assets correlate with fixed assets, net worth, short-term liabilities, net sales, cost of sales and number of workers. Net Worth is the shareholders' equity – money contributed by the owners to buy productive capacities in order to generate

revenues. So basically the net worth is fixed assets and fixed assets are the greatest part in the total assets. Short-term liabilities represent the money borrowed for the working capital which also naturally correlates with the assets of the enterprise. The more assets an enterprise has, more output it can generate thus more sales it makes (ceteris paribus), and respectively cost of sales (with negative sign). And of course the number of workers increases along with the productive equipment. The same relationships are preserved by the fixed assets and net worth variables. Senior bank debt representing long-term bank credits and other long-term financial liabilities, which usually represent bonds issued by the entity or other long-term funding taken for development; strongly correlate with long-term liabilities. The number of workers variable correlate with short-term liabilities and cost of sales because the wages represent the greatest part of the expenses. Net sales logically negatively correlate with the cost of sales and positively with the number of workers.

There is a possibility as well that my model is misspecified. As discussed above certainly my data set (for instances compared to that one which Lopez-de-Silanes uses) misses a number of explanatory variables which could better describe what influences the privatization prices in Ukraine. Also the multicolinearity between the variables which are available, forces to use them separately in the regression analysis, which is also a variety of misspecification. The company specific variables are expressed in Ukrainian hryvnias as well as the privatization prices. As mentioned before the sample comprises the medium and large privatization cases, among which are the largest industrial entities of Ukraine. Therefore there are a certain small number of observations which are relatively very large compared to others as well as a couple of observations which are relatively very small. The regression analysis is done both using the whole sample as well as using a sample short listed by those outliers. The purpose is to see whether those outliers have an influence on the results.

METHODOLOGY

The methodology described below is meant to explain two variables: the privatization prices and the Net Government Revenue (NGR). The idea is to investigate the determinants of privatization prices. What is the reasoning of the investors when they decide about investing, what do they look at when they decide about what price to offer?

The nature of the data and its construction implies no other estimation method than Ordinary Least Squares. All the regressions will be checked for heteroskedasticity and if its presence is detected robust estimator will be applied. One more option to go around this problem would be to use a log-linear model i.e. take as the dependent variable natural logarithm of prices. The functional form of the regressions is the following:

$$price = \alpha * YD + \beta * CS + \gamma * CFVRD + \varphi * L + \phi * GA + \delta * ID + \varepsilon,$$

where:

YD - year dummies;

CS - company specific factors;

$CFVRD$ - cash flow and voting rights dummies;

L - labor related factors;

GA - geographical appurtenance dummies;

ID - industry dummies;

ε - disturbance term.

The expected influence of the time, industry and geographical appurtenance dummies is ambiguous. We expect that cash flow and voting rights dummies to have a positive influence on the privatization price. The expected influence of the company specific factors is somewhat obvious: the assets, revenues and

the size of the stake will have a positive influence on the price, the liabilities and costs respectively negative. The influence of labor related factors on the privatization price has benefited from much research. We expect that the number of workers will have a negative influence on the price since the number of workers is directly proportional to costs. The idea that the number of workers is directly proportional to revenues has also a right to exist however entities shift more and more their production to more efficient means - capital (equipment) thus getting rid of relatively unproductive and inefficient labor. However the defined in Table 3.1 productivities are expected to have a positive influence. Capital intensity and the Net Worth per worker are expected to influence positively.

On the other hand Shleifer and Vishny (1994) say that the government has two objectives when privatizing: first is to generate revenue and second to stimulate efficiency improvement and depolitization of the SOEs. When the government decides on privatization it has to solve two main problems, first is when to privatize and second it has to decide about the pricing. Both parts of the decision making can be theoretically modeled. Therefore it is interesting to see the flip side of the coin – what influences the so called Net Government Revenue. According to the law of privatization the government from one hand guarantees the maximization of the proceeds from privatization because the winner is announced the company which offers the highest price. However the case of Krivorizhstali (and other) indicates that this is not exactly true because the participants who offered much higher price than the actual winner were disqualified.

Basically the influence of the explanatory variables a priori should be the same as in the case of the logarithmic privatization prices, however surprises are possible. The functional form of the main equation is the same:

$$NGR = \alpha * YD + \beta * CS + \gamma * CFVRD + \varphi * L + \phi * GA + \delta * ID + \varepsilon$$

The estimation technique will be the same as well.

Lopez-de-Silanes (1996) and Arin and Okten (2003) use in their research the adjusted privatization prices, however they propose different methods of adjustment. In summary basically they suggest to calculate a net privatization price controlled for inflation, taking into account the costs of privatization, normalization by the total assets and total debt, etc. The Net Government Revenue from privatization, which the government should optimize, can be expressed in the following way:

$$NGR_{t,i} = P\,(NW,RI)_{t,i} - NW_{t,i} * Depth_{t,i} + PV(\sum_{t}^{T} tr * EBT_{t,i}) - RI_{t,i}$$

(4.1), where:

$P_{t,i}(NW,RI)$, is the final price which depends on the Net Worth and RI,

$NW_{t,i}$, is the net worth or Total Assets – Total Debt or liabilities (TA-TD),

$PV(\sum_{t}^{T} tr * EBT_{t,i})$, is the present value of the sum of the future tax proceeds form the entity's revenues (tax rate multiplied by the Earnings before Tax),

$RI_{t,i}$, is the restructuring investments undertaken by the state before privatization.

The experience of other countries suggests that governments usually undertake restructuring investments in order to make the enterprise more attractive and increase the privatization price. However this is what not always happens in Ukraine. The Ukrainian government puts the burden of restructuring and investments on the buyer. When an enterprise in Ukraine is privatized the buyer assumes certain investment obligations, this is a requirement set by the government. However in some cases this restructuring can be observed therefore the equation still contains this component.

From the practical point of view it is almost impossible to project the future revenues of the enterprise therefore some components of the equation (1) can not be calculated even if we choose the discount rate, therefore further the

NGR will be defined as the difference between the privatization price and the Net Worth multiplied by the Depth of privatization. The solution of the maximization of the equation (4.1) would be the answer to the question of pricing. The answer to the question of timing is given by the inequality below:

$$PV(\sum_{t=t0}^{T}NP)*Depth < P_{t0} - (TA-TD)_{t0}*Depth + PV(\sum_{t=t1}^{T}tr*EBT)$$

(4.2), where:

NP - net profit.

And the inequality sign is strict because if the two sides are equal there is no sense in privatizing because the government incurs some privatization costs. The left hand side of the equation 4.2 presents the opportunity cost of privatizing, income foregone by the government if it sells the enterprise.

The efficiency of the government decisions is measured by the two equations (4.1 and 4.2).

EMPIRICAL ANALYSIS AND DISCUSSION

This section presents the empirical analysis on the relationship between the privatization prices and company specific factors.

The analysis was done first on the raw prices; the purpose is to see what determines the privatization prices as they are with no changes and adjustments. The general specification looks as follows:

$$\Pr ice = \alpha * YD + \beta * CS + \gamma * CFVRD + \varphi * L + \phi * GA + \delta * ID + \varepsilon$$

(Equation 5.1.)**,** where:

YD - year dummies;

CS - company specific factors;

CFVRD - cash flow and voting rights dummies;

L - labor related factors;

GA - geographical appurtenance dummies;

ID - industry dummies;

ε - disturbance term.

If we regress the raw prices on the explanatory variables specified in the model we receive very confuse and ambiguous results. There are two reasons for that. First is that the regressions with the dependent variable as prices exhibit heteroskedasticity problem, which is proven using the White Heteroskedasticity test. The second reason which we believe has the greatest negative influence on the regression statistics is that the raw prices do not control for the fact the prices were paid for different sizes of the stakes and the effect of the independent variables is not proportional even if the variable Depth (stake percentage) is included in the regressions. Therefore the explanatory variables as well as the dependent one should be adjusted somehow. There are two options for that. First would consist in dividing all the variables by size of the privatized stake i.e. normalizing and adjusting over

the sample. The second option would be to take natural logarithm of the prices as the dependent variable. The logarithmic function is a monotonic transformation which first of all reduces heteroskedasticity and secondly makes the effect of the explanatory variables comparable. The slope coefficients give a relative change (percentage change) in the dependent variable as a consequence of an absolute change in the respective explanatory variable.

Other authors seem to have paid less attention to the issue of heteroskedasticity which is so drastic in my sample. In related literature no heteroskedasticity test was mentioned. The presence of the heteroskedasticity would make the interpretation of the results controversial. Arin and Okten (2003) talk about heterogeneity, which is present in their sample. They do their analysis on a cross industry sample but then they concentrate their analysis solely on the cement production industry. This move solves only partially the problem because the number of observations in the new sample (just cement production industry) becomes very small – 24, which limits the strength of the conclusions.

Chong and Galdo (2003) analyze just one industry (telecommunication) having 84 observations, however their sample is cross-country one which preserves the heteroskedasticity feature anyway.

Therefore further the log-linear econometric model will be considered. The model has the same functional form as in Equation 5.1., only that the dependent variable is the natural logarithm of prices. Appendix 1 presents the results of the general estimation, regression with the full set of variables.

The general estimation shows that the Capital Intensity, NW per worker and the geographical appurtenance dummies are significant at 5% significance level. Senior Bank Debt, Net Sales and Net Profit productivities, Cost of Sales per worker and number of workers are significant at 10% significance level. Almost all the variables are related to the labor factors; therefore it can be assumed that the labor factor is one of the main determinants of the

privatization prices, which is also evidenced by Lopez-de-Silanes (1996), Chong and Lopez-de-Silanes (2002), etc. However if the attention is paid to the coefficients of the significant variables many of them are economically counterintuitive. The reason is that many variables are colinear, therefore in what follows the specifications will be restricted and the way we restrict the specifications is going from general to specific.

The regression analysis (see Appendix 1) indicates that the investors in Ukrainian economy do not really care in what industry to invest. The industry dummies are found to be insignificant. This finding is somewhat surprising because it means that whether: 1) investors believed that state owned enterprises from all industries are very inefficient and the pre investment analysis would not show much – the margins and the overall performance is not credible and that the investors had there own scenarios of industries' development and their conditions or 2) investors believed that all sectors of the Ukrainian economy will exhibit high rates of development, that the economy will grow as an emerging market, so they were investing money in everything which was expected to generate revenues.

Appendix 2 presents the estimation results of one of the restricted specifications coefficients of which are economically consistent.
Among the year dummies the only significant is the one for 2003. It has negative coefficient. The result indicates that the year 2003 was different from others and that the prices were lower compared to other years.

Since the estimation specification has an intercept, which is significant it represents the influence of the dummy variables which were automatically dropped. Therefore the base dummy is an enterprise privatized in 1998 with a stake falling in the range 0-25% bought by a western entity. The second CFVR category (25%+1 share – 50%) is statistically indistinguishable from the first meaning that a stake ranging from 0% to 50% has the same voting

power, however the third (50%+1 share – 75%) and the fourth (75%+1 share – 100%) are significant. In the data description section was stated the expectation that each 25% +1 share stake to have importance, and the finding suggests the opposite. It seems that the stakes: 50%, 50% +1 share - 75 % and 75%+1 – 100% are important from the cash flow and voting rights point of view. Therefore it can be concluded that the investors in Ukraine care indirectly about the size of the stake they compete for. This is also indicated by the fact that the variable Depth is significant alone (without CFVR dummies) but it is not significant in the combination with the cash flow and voting rights dummies in the regressions. So, obviously the privatization price is an increasing function of the size of the stake but more important is what power the bought stake confers to the investor over the enterprise. This finding confirms the similar result obtained by Lopez-de-Silanes 1996.

The significance of the Geographical Appurtenance dummies is somewhat surprising. First of all it means that the country of origination of the participant to the tender has an influence on the privatization price. The sign and the size of the coefficients indicate that the geographical appurtenance has a negative influence on the price in the case of eastern and domestic participants; in the case of western companies the influence is positive. One of the explanations would be that certain categories of participants had different target groups of entities and that the western companies targeted the most expensive companies while eastern and domestic targeted the less expensive ones. However the fact that one third (11 observations) of western buyers are probably off shores belonging to domestic and Russian entities somewhat contradicts this hypothesis. Definitely a conclusion would be that the enterprises bought through the intermediary of the off shores are different from the ones bought directly by domestic entities. Enterprises bought by off shores belong to the oil and gas mining and energy generating industries. Also one of the possible explanations would be that domestic and eastern participants were favored. However another hypothesis would be that

western companies were more optimistic about the future prospects and performance companies they were targeting thus offering higher price compared to Ukrainian and Eastern peers.

As mentioned before the number of eastern companies is very small – four. Therefore the effect of this dummy is doubtful. Since the domestic dummies and eastern dummies both have a negative influence on the privatization price it hints to the conclusion that those two are strongly interrelated, and there is sense to include the four observations for the eastern companies in the domestic category. Appendix 3 shows the estimation statistics.

The inclusion of the eastern companies in the category of domestic ones does not change the results for Geographical Appurtenance dummies.

As discussed in the data section there is sense to analyze the specification where we will have a dummy for an off shore company and a different set up for the CFVR dummies, having the last two categories: 50% + 1 share – 60% - 1 share (25 observations) and 60% - 100% (37 observations). The results are shown in Appendix 4.

Surprisingly according to the estimations we can not distinguish between an off shore and a western buyer, perhaps because of low number of observations for off shores – 11, so there is no point in having a separate dummy for off shores. Or maybe because the enterprises bought through off shores were indeed more expensive than bought directly by domestic winners.

An expected result, which confirms previous findings, is that in the second set up for CFVR dummies all the categories are significant.

Further we have introduced a dummy variable for a stake, which ranges from 60% to 75% (14 observations) in order to see whether it is significant and to check whether the categories 50% + 1 share – 60% - 1 share and 75% + 1 share – 100% are still important. We have dropped the category 0 – 25% in order to make the categories comparable. And indeed these categories are

significantly different from the omitted category (see Appendix 5). The finding that the category 25% - 50% is not important is confirmed. We have performed a t-statistic test for significance of the category 50% - 60% - 1share from the category 60% - 75%, which showed that they are indistinguishable. Given this result we will keep in the regressions the category 50% - 60% - 1 share to show that it differs from the category 25% +1 share – 50%.

The regression analysis evidences that among company specific factors significant (in the mentioned specification) are Fixed Assets, Short Term Liabilities and the Net Sales. However due to the described in chapter 3 relationships between company specific variables (correlation) in other specifications significant are found and other variables (which will be described somewhat later). The positive influence of the revenues which the enterprise to be privatized generates is as well evidenced by Lopez-de-Silanes (1996) and Arin and Okten (2002). This result indicates that the investors pay attention to the ability of the potential enterprise to generate funds. If we replace in the same regression the variable Net Sales by the Cost of Sales we find that it is significant. However it has a counterintuitive negative coefficient. Its significance is conditioned by the fact that the Cost of Sales are an indicator of size and by the fact that Cost of Sales are highly colinear with Net Sales (correlation coefficient is (-0.9821), so those two variables are basically the same. Therefore no attention is going to be paid to this variable. One more reason to exclude Cost of Sales from our consideration is that if we include in the specification the Net Profit or The Gross Margin variables they are absolutely insignificant meaning that indirectly Cost of Sales do not matter for the price. This proves the similarity with Lopez-de-Silanes (1996), Arin and Okten (2002), etc. consisting in the fact that investors do not pay a great attention to the expenses because they believe that state enterprises are inefficient and anyway after privatizing by implementing new strategy and policy they will achieve the necessary efficiency. Investors in Turkey pay attention to the revenues and not profits. So investors seem to exhibit the

same logic, they care about the ability of the enterprises to generate revenues and the expenditure part can be improved.

An interesting finding which has no evidence in similar research is the fact that Short Term Liabilities influence the privatization prices. Naturally, their effect is negative. STL represent funds which need to be immediately or shortly paid off. And of course investors take this into account when making an investment decision.

Based on the results of the main regression specifications it can be concluded that Fixed Assets are one of the factors, which investors look at. This finding is different from previous. Country specific situation might be one of the explanations. According to the State Statistics Committee the degree of depreciation of the equipment of the Ukrainian enterprises is high (more than 50%), especially that one inherited from the Soviet Union. So the quality of the equipment is the corner stone in the investors' decisions, because they pay a great attention to the book value of the equipment and the residual value. The proximity of the residual value to the book value (purchase value) is an approximation of the quality and the level of depreciation. So if the residual value is relatively close to the book value it indicates that the depreciation is small, which means that the quality of the equipment is relatively higher. In our case there is positive influence of the residual value of the equipment on the privatization price. The issue is, whether the investors have to spend a lot of money and invest in the new equipment immediately in order to keep the entity lucrative. Arin and Okten (1996) find somewhat different results. They say that important is the ratio of capacity utilization and not the equipment (Fixed Assets) itself, meaning that the investors are looking for unexploited opportunities.

The estimation results are unchanged if outliers are excluded from the regression specification with dependent variable as natural logarithm of price. Therefore the estimation outcomes are robust.

However it must be mentioned that due to the correlation relationships (mentioned in previous chapters) between company specific factors we can not exactly distinguish what has the greatest influence on the prices. Because other regression specifications indicate that Total Assets, Net Worth are also significant (see Appendix 6.1 and 6.2).

The influence of Labor factors is interesting. In the general regression labor related factors are the only significant, however in the restricted specifications if they come with company specific factors like FA or NS, etc. they are not. However (Appendix 7) in some specifications for instance the number of workers is found to be significant and this variable has a small positive effect on the privatization price. Also the productivity of the Net Sales is significant at 10% significance level (see Appendix 8). This finding is not in line with the findings of Arin and Okten (2002) for example. The reason is that like in my sample the variable Number of Workers correlates with other company specific factors.

The general estimation result of the influence of the explanatory variables on the NGR is shown in Appendix 9.
It can be seen that we have a lot of significant variables but their influence is counter intuitive. This is due to multicolinearity and heteroskedasticity. If however we control for heteroskedasticity, running the regression with robust error terms than we receive that (see Appendix 10) there are no significant variables except for some year dummies with a doubtful influence. The restricted specifications like in Appendix 11 also reveal no significant variables except for the Senior Bank Debt, which influence is counter intuitive. Thus the estimations show that whether the variable NGR lacks economic meaning or the influence on it can not be estimated due to data problems.

Another functional form of the dependent variable we analyzed was the price variable divided by the depth variable in percentage points. The intuition

behind this procedure is somewhat similar to the one of taking natural logarithm of prices. This transformation would normalize over the prices to make them comparable, and the effect analyzed would be on the price per 1% stake. However this procedure does not give any significant results.

Finally we reclassified the industry dummy variables from 14 categories to 6 and namely: 1) heavy industry which includes: mining, metals, machine building, cars an construction industries; 2) energy generating industry; 3) light industry which includes: food and paper industries; 4) services which includes: transportation and tourism; 5) chemical industry which includes: oil and gas and chemistry and 6) trade and finance industry. However this procedure does not change previous results, so even after consolidating the industries in more aggregate ones they are still insignificant (see Appendix 12).

One of the best specifications (Appendix 13) is the following (from the sample is excluded one outlier):

Table 5.1. Dependent variable: price

Variable	Coefficient	t-statistic
Const* (an entity privatized in 2004 by a western company with a stake ranging from 0 to 25%)	$e^{14.282}$	23.44
Fixed Assets*	$e^{6.54*10^{-9}}$	5.34
Net Sales*	$e^{4.66*10^{-9}}$	4.80
Short term Liabilities***	$e^{-1.66*10^{-9}}$	-1.63
Dummy for 2003**	$e^{-1.324}$	-2.79
Dummy for domestic winner**	$e^{-0.811}$	-2.60
Dummy for stake between 25% + 1share and 50%	$e^{0.416}$	1.39
Dummy for stake between 50% + 1share and 60% - 1 share**	$e^{1.084}$	2.82

Dummy for stake between 60% and 75% **	$e^{1.36}$	2.95
Dummy for stake between 75%+ 1share and 100% *	$e^{2.334}$	5.61
R-squared	0.5927	
F-statistic	16.32	Prob>F: 0.000
Heteroskedasticity test H_0: constant variance $\Rightarrow$ H_0 accepted	$\chi^2 = 0.85$	Prob> $\chi^2 = 0.3553$

* - significant at 1% significance level
** - significant at 5% significance level
*** - significant at 10% significance level

However this specification has a drawback. It has omitted variables according to the Ramsey misspecification test (see Appendix 14). Further regression analysis shows that the prices depend non-linearly on the company specific factors.

Table 5.2. Dependent variable: price (squares of company specific factors and industry dummies included)

	Specifications	
Explanatory variables	**(1)**	**(2)**
Constant term (a company from trade and finance industry with a stake in 0-25%, sold to a western entity 2004)	exp(13.02) 16.84*	
Constant Term (company from trade and finance industry sold to a western entity in 2004)		exp(13.046) 17.54*
Time dummies included. All are insignificant except for the year 2003 and	exp(-1.346) -3.19*	exp(-1.321) -3.17*
for year 1998	exp(-0.828) -1.67***	exp(-0.84) -3.17
Industry dummies insignificant except for Chemical industry dummy	exp(1.07) 1.68***	exp(1.067) 1.69***
Fixed Assets	exp(1.36*10^-8) 4.65*	Exp(1.46*10^-8) 5.05*
Net Sales	exp(9.47*10^-9) 4.01*	exp(8.82*10^-9) 3.77*
Short Term Liabilities squared	exp(-6.8*10^-18)	exp(-7.01*10^-18)

		-3.34*	-3.50*
Fixed Assets squared		exp(-3.39*10^-17) -5.06*	exp(-3.54*10^-17) -5.36*
Net Sales squared		exp(-7.25*10^-18) -3.29*	exp(-6.76*10^-18) -3.10*
Total Assets squared		exp(5.02*10^-18) 3.17*	exp(5.16*10^-18) 3.30*
Dummy for a domestic winner		exp(-0.55) -1.92***	exp(-0.645) -2.29**
Depth squared			exp(3.125) 6.57*
Dummy for stake between 25% + 1share and 50%		exp(0.13) 0.49	
Dummy for stake between 50% + 1share and 60% - 1 share		exp(0.88) 2.59**	
Dummy for stake between 60% and 75%		exp(1.149) 2.76*	
Dummy for stake between 75%+ 1share and 100%		exp(2.098) 5.58*	
R-squared		0.7017	0.6994
F-statistic		15.93	18.61
Heteroskedasticity test H_0: constant variance $\Rightarrow$ H_0 accepted		$\chi^2 = 0.04$ Prob> $\chi^2 = 0.8441$	$\chi^2 = 0.24$ Prob> $\chi^2 = 0.6267$
Ramsey (reset) Omitted Variables Test		F(3, 145) = 1.89 Prob>F = 0.1334	F(3, 145) = 1.7 Prob>F = 0.1686

Note: below the coefficients are reported t-statistics
* - significant at 1% significance level
** - significant at 5% significance level
*** - significant at 10% significance level

Specification (1) and (2) show that squares of the company specific factors significantly influence the privatization prices. Specification (1) indicates that the total assets squared, net sales squared, fixed assets squared and short term liabilities squared have additional explanatory power however the levels of the short term liabilities are not significant any more. The second specification seems to explain somewhat more the prices. In this case the size of the stake squared is found to be significantly influential. Thus the influence of the cash flow and voting rights dummies is similar to the influence of the size of the stake squared, the latest having greater explanatory power and higher significance. The industry dummies are extremely informative (large

explanatory power) for the price, which is also proven by their joint significance test (see Appendix 15). Also after inclusion of the squared company specific variables the dummy for chemical industry became significant at 10%. Probably some of the industry dummies would be significant as well in a larger sample. The signs of the coefficients show the following relationships between the prices and the company specific variables:
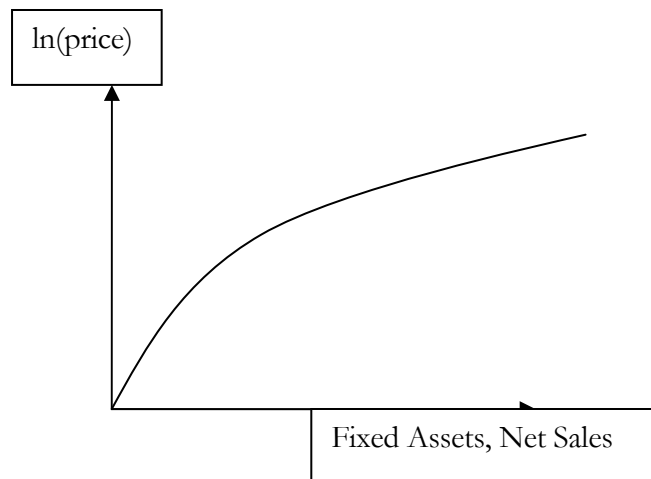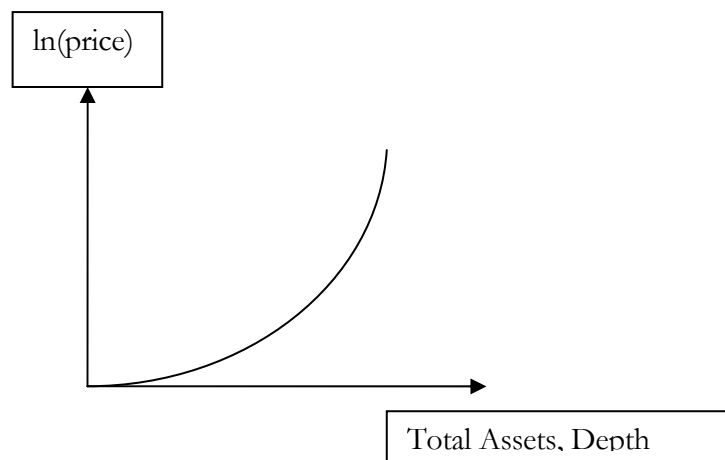
Thus, the marginal effect of the variables: Net Sales and Fixed Assets on the price declines with their increase. And the marginal effect of the size of the stake squared and of the Total Assets is increasing. The price decreases more, the more the Short Term Liabilities increase. The effect of the squared size of

the stake is intuitive because the more it increases the more cash flow and voting rights the buyer receives the higher is the price.

Since the dependent variable is in natural logarithms then for small numbers they are close to as they would be expressed in per cents. So according to specification (1), the price of company from trade and finance industry privatized in 2004 by a western bidder with a stake falling in the range: 0-25% (base dummy) is $e^{13.02}$ UAH (451350) if everything else is equal to zero. The stake falling in the category 25% +1 share – 50% is indistinguishable from 0 - 25%. If however the size of the stake falls in the category over 50% + 1 – 60% - 1 share then the price increases by $e^{0.88}$ or approximately by 141%, if the size falls in the category 60% - 75% the price increases by $e^{1.149}$ or by 215% and if the size corresponds to the category 75% + 1share – 100% then the price increases by $e^{2.098}$ or 715% compared to the base dummy variable. The privatization prices were lower in 2003 by $e^{1.346}$ or by 74% $((e^{-1.346}$ - 1)*100%) and for the year 1998 by $e^{0.828}$ or by 56.3% $((e^{-0.828}$ -1)*100%) compared to the base dummy. The price for a domestic buyer was lower by $e^{0.55}$ or by 42.3% $((e^{-0.55}$ -1)*100%) compared to the base dummy. The coefficients of the company specific factors are economically insignificant, due to their small size. The effect of 1 UAH increase in the Fixed Assets, Net Sales, etc is very small; however if the Fixed Assets increase by one standard deviation then the effect is absolutely different and namely $e^{\alpha_i * \sigma_{xi}}$, in figures:

Variable	Change in coefficient if the variable increases by 1 st. dev.
Fixed Assets	$e^{1.782}$
Net Sales	$e^{1.82}$

CONCLUSIONS

This research analyzes the determinants of privatization prices in Ukraine. The privatization process in this country is characterized as controversial due to cases of corruption and favoritism. The analysis is based on a cross-industry sample comprising the period starting from 1998 till 2004. The sample contains large and medium privatization cases, which took place during the most representative period in the history of Ukrainian privatization and economic reforms. The case of Ukraine presents interest due to the following reasons. Internal political issues involved (controversy). External geo-political position of Ukraine – this country is among world leaders in a number of industries; it is in the middle of cross attention of the west (EU and USA) and the East (Russian Federation). On this background it is interesting to see the process of pricing of privatized entities in Ukraine, what do investors look at when taking decisions and does the government behave rationally. This research is the first to analyze the privatization prices in Ukraine. The research answers the questions: what company specific factors matter for the privatization price, whether the geographical appurtenance of the buyer matters, how the peculiarities of the sold stake influence the price, etc.

The analysis shows that the investors did not differentiate among industries, because they are found to be insignificant for the determination of the price as in the disaggregated case (14 industries) as in the aggregated one (6 industries) except for the case when the specification contains squares of company specific variables. However industry dummies are informative which is shown by the test of joint significance in the case of 6 industry dummies. Net Sales and Fixed Assets influence positively the privatization

price and the Short Term Liabilities –negatively. Moreover their effect is non-linear, meaning that the marginal effect is not constant with the increase/decrease in the variable. The price for the domestic investor is found to be lower than for a western one. Interesting thing being that the regression analysis shows that we can not differentiate between a western company and off shores belonging to domestic and eastern buyers. Investors are found to care indirectly about the depth of privatization, because they are interested more in the power they receive over the company acquiring the stake than in the stake itself.

There are several interesting and important topics in the Ukrainian privatization, which deserve to be researched. For instance it would be interesting to see what are the characteristics of the winning enterprise in a privatization contest. Until recently Ukraine never had billionaires. However according to Forbes ratings of the richest individuals across the world in Ukraine suddenly appeared a number of them. Does this fact have any link to the privatization? Was it possible due to certain country specific conditions, favoritism of the political leadership of the country or something else?

Also it is interesting to see whether the Ukrainian government had a certain plan or strategy when privatizing, or this happened randomly. Finally the efficiency of Ukrainian privatization merits attention.

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Appendix 0. Matrix of Correlation between company specific factors

	TA	FA	NW	NP	SBD	OLTFL	LTL	STL	NS	CS	Depth	Workers
TA	1.0000											
FA	0.8693	1.0000										
NW	0.8307	0.8869	1.0000									
NP	0.1581	0.0070	0.1161	1.0000								
SBD	0.1523	0.2176	0.0081	0.0684	1.0000							
OLTFL	0.1101	0.0791	0.0238	-0.1342	-0.0240	1.0000						
LTL	0.3965	0.4666	0.2515	0.0849	0.7722	0.3895	1.0000					
STL	0.8940	0.6283	0.5072	0.1467	0.1195	0.0964	0.2833	1.0000				
NS	0.8164	0.6804	0.6251	0.3338	0.2338	0.0475	0.4154	0.7482	1.0000			
CS	-0.7554	-0.6076	-0.5275	-0.3025	-0.2235	-0.0649	-0.3893	-0.7306	-0.9821	1.0000		
Depth	-0.1780	-0.1628	-0.1800	-0.0926	0.0618	0.0431	-0.0108	-0.1385	-0.1921	0.1687	1.0000	
Workers	0.7879	0.7823	0.8285	0.2339	0.0953	-0.0046	0.2907	0.5617	0.6879	-0.6088	-0.1572	1.0000

Appendix 1. Dependent variable – logarithm of price.

```
  Source |       SS       df       MS              Number of obs =     173
---------+------------------------------           F( 41,   131) =    7.91
   Model | 580.96695     41  14.1699256            Prob > F      =  0.0000
Residual | 234.551018    131  1.79046578           R-squared     =  0.7124
---------+------------------------------           Adj R-squared =  0.6224
   Total | 815.517968    172  4.74138354           Root MSE      =  1.3381
```

```
------------------------------------------------------------------------------
        L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
         TA |  -4.17e-09   2.57e-08    -0.16   0.871    -5.50e-08    4.66e-08
         FA |   1.27e-09   3.18e-09     0.40   0.690    -5.02e-09    7.56e-09
         NW |   5.75e-09   2.54e-08     0.23   0.822    -4.46e-08    5.61e-08
         NP |  -1.08e-08   8.98e-09    -1.20   0.232    -2.85e-08    6.98e-09
        SBD |   1.85e-08   1.08e-08     1.72   0.088    -2.81e-09    3.98e-08
      OLTFL |  -1.37e-08   2.03e-08    -0.67   0.502    -5.39e-08    2.65e-08
        LTL |   1.67e-09   2.73e-08     0.06   0.951    -5.24e-08    5.57e-08
        STL |   3.08e-09   2.56e-08     0.12   0.905    -4.76e-08    5.38e-08
         NS |   3.13e-09   5.40e-09     0.58   0.563    -7.55e-09    1.38e-08
         CS |   3.32e-10   5.54e-09     0.06   0.952    -1.06e-08    1.13e-08
      Depth |   1.08566   1.693338      0.64   0.523    -2.264167    4.435486
    Workers |  .0001371   .0000749     1.83   0.070    -.0000111    .0002852
        D98 | (dropped)
        D99 |  .2683913   .4993827     0.54   0.592    -.7195068    1.256289
        D00 |  .5836822   .4569873     1.28   0.204    -.3203477    1.487712
        D01 |  .6508399   .4542894     1.43   0.154    -.2478529    1.549533
        D02 |  .0609863   .5028011     0.12   0.904    -.9336743    1.055647
        D03 |  -.596317   .4821363    -1.24   0.218    -1.550098    .3574636
        D04 |  .7678716   .5927482     1.30   0.197    -.4047257    1.940469
  Cap_Intens |  -9.11e-06   3.68e-06    -2.47   0.015    -.0000164   -1.82e-06
 NW_per_Labor |   .000011   4.39e-06     2.51   0.013     2.35e-06    .0000197
 Productivi~P |  .0000134   7.96e-06     1.69   0.094    -2.31e-06    .0000292
 Productivi~S |  -.0000118   7.04e-06    -1.67   0.096    -.0000257    2.14e-06
         D1 | (dropped)
         D2 |  .1706234   .3471302     0.49   0.624    -.5160829    .8573298
         D3 |  .5555846   .6654697     0.83   0.405    -.7608731    1.872042
         D4 |  1.141556   1.092941     1.04   0.298    -1.020542    3.303653
   D_Energy |  1.134348   1.863944     0.61   0.544    -2.552978    4.821675
   D_Mining |  .6016241   1.703686     0.35   0.725    -2.768674    3.971922
   D_Metals |  .5593503   1.705182     0.33   0.743    -2.813906    3.932606
 D_Construc~n |  -.6520814   1.700082    -0.38   0.702    -4.015248    2.711085
  D_MBuilding |  -.5299858    1.66222    -0.32   0.750    -3.818254    2.758282
  D_Chemistry |  .4139965   1.739685     0.24   0.812    -3.027516    3.855509
    D_Oil_Gas |  .3048027   1.738236     0.18   0.861    -3.133842    3.743447
       D_Food |  -.2100796   1.860854    -0.11   0.910    -3.891293    3.471134
      D_Trade |  -1.813525   1.806784    -1.00   0.317    -5.387776    1.760725
      D_Paper |  .0253672    1.74224     0.01   0.988    -3.421199    3.471934
 D_Transpor~n |  -.612923   1.779675    -0.34   0.731    -4.133545    2.907699
       D_Cars |  .5383738   1.799639     0.30   0.765    -3.021741    4.098489
    D_Tourism |  -.0559692   1.867695    -0.03   0.976    -3.750716    3.638778
    D_Finance | (dropped)
        D_Ukr |  -.7330484   .3369857    -2.18   0.031    -1.399686   -.0664103
       D_West | (dropped)
       D_East |  -2.680989   .9848487    -2.72   0.007    -4.629254   -.7327229
          GM | (dropped)
 CS_per_Wor~r |  -.0000124   7.35e-06    -1.68   0.095    -.0000269    2.18e-06
       _cons |  13.48214   1.823666     7.39   0.000     9.874492    17.08979
```

Appendix 2. Dependent variable – logarithm of price.

```
Source |       SS       df       MS              Number of obs =     173
-------------+------------------------------        F( 14,   158) =   16.54
       Model |  484.764672    14   34.626048        Prob > F      =  0.0000
    Residual |  330.753296   158  2.09337529        R-squared     =  0.5944
-------------+------------------------------        Adj R-squared =  0.5585
       Total |  815.517968   172  4.74138354        Root MSE      =  1.4469


------------------------------------------------------------------------------
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  (dropped)
         D99 | -.0903987   .4393762    -0.21   0.837    -.958207    .7774097
         D00 |  .4217343   .4258351     0.99   0.324    -.4193293   1.262798
         D01 |  .6442892   .4408425     1.46   0.146    -.2264153   1.514994
         D02 |   -.03428   .4605086    -0.07   0.941    -.9438268    .8752668
         D03 | -.8738148   .4492737    -1.94   0.054    -1.761172    .0135422
         D04 |  .7072481   .5192753     1.36   0.175    -.3183683   1.732865
          FA |  6.18e-09   1.24e-09     4.99   0.000     3.73e-09    8.63e-09
          NS |  4.86e-09   9.85e-10     4.93   0.000     2.91e-09    6.80e-09
         STL | -1.73e-09   1.03e-09    -1.67   0.096    -3.76e-09    3.10e-10
          D1 |  (dropped)
          D2 |  .3509637   .3036263     1.16   0.249    -.2487262    .9506536
          D3 |  1.129571   .3444044     3.28   0.001     .4493406    1.809801
          D4 |  2.379436   .4215362     5.64   0.000     1.546863    3.212009
       D_Ukr | -.8189842   .3208055    -2.55   0.012    -1.452605   -.1853638
      D_West |  (dropped)
      D_East | -2.377505   .9043064    -2.63   0.009    -4.163593   -.5914169
       _cons |  13.90781   .4902803    28.37   0.000     12.93946    14.87615
------------------------------------------------------------------------------


. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
       Ho: Constant variance
       Variables: fitted values of L_P

       chi2(1)      =      2.34
       Prob > chi2  =    0.1261
```

```
Regression with robust standard errors          Number of obs =     173
                                                F( 14,   158) =   21.04
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5944
                                                Root MSE      =  1.4469


------------------------------------------------------------------------------
             |               Robust
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  (dropped)
         D99 |  -.0903987   .3850871    -0.23   0.815    -.8509812    .6701838
         D00 |   .4217343   .3710816     1.14   0.257    -.3111861   1.154655
         D01 |   .6442892   .4065863     1.58   0.115    -.1587562   1.447335
         D02 |    -.03428   .401128     -0.09   0.932    -.8265447    .7579847
         D03 |  -.8738148   .4822695    -1.81   0.072    -1.826342    .0787119
         D04 |   .7072481   .4847026     1.46   0.147    -.2500841    1.66458
          FA |   6.18e-09   1.74e-09     3.55   0.001     2.74e-09   9.62e-09
         STL |  -1.73e-09   8.40e-10    -2.05   0.042    -3.38e-09  -6.64e-11
          NS |   4.86e-09   1.31e-09     3.70   0.000     2.26e-09   7.45e-09
          D1 |  (dropped)
          D2 |   .3509637   .2893278     1.21   0.227    -.2204854    .9224128
          D3 |   1.129571   .3159847     3.57   0.000     .5054722    1.75367
          D4 |   2.379436   .4307421     5.52   0.000     1.528681   3.230191
       D_Ukr |  -.8189842   .2600901    -3.15   0.002    -1.332686   -.3052823
      D_West |  (dropped)
      D_East |  -2.377505   1.062383    -2.24   0.027    -4.475809   -.2792012
       _cons |   13.90781   .4477158    31.06   0.000     13.02353   14.79209
------------------------------------------------------------------------------
```

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Appendix 3. Dependent variable – logarithm of price.

```
      Source |       SS       df       MS              Number of obs =     173
-------------+------------------------------           F( 13,   159) =   17.33
       Model |  478.096158    13  36.7766275           Prob > F      =  0.0000
    Residual |  337.421811   159  2.12214975           R-squared     =  0.5862
-------------+------------------------------           Adj R-squared =  0.5524
       Total |  815.517968   172  4.74138354           Root MSE      =  1.4568


------------------------------------------------------------------------------
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  (dropped)
         D99 |  -.0827793   .4423647    -0.19   0.852    -.9564479    .7908892
         D00 |    .427421   .4287398     1.00   0.320    -.4193385     1.27418
         D01 |   .5224144   .4385049     1.19   0.235     -.343631     1.38846
         D02 |  -.0239696   .4636262    -0.05   0.959    -.9396296    .8916905
         D03 |  -.9207968   .4515738    -2.04   0.043    -1.812653   -.0289403
         D04 |   .7073962   .5228319     1.35   0.178    -.3251949    1.739987
          FA |   6.25e-09   1.25e-09     5.01   0.000     3.78e-09    8.71e-09
          NS |   4.69e-09   9.88e-10     4.75   0.000     2.74e-09    6.64e-09
         STL |  -1.62e-09   1.04e-09    -1.56   0.120    -3.67e-09    4.26e-10
          D1 |  (dropped)
          D2 |   .3578398   .3056813     1.17   0.243    -.2458797    .9615592
          D3 |   1.118095   .3467029     3.22   0.002      .433358    1.802832
          D4 |   2.424335    .423667     5.72   0.000     1.587594    3.261075
  D_Domestic |  -.8676835   .3218324    -2.70   0.008    -1.503301   -.2320658
   D_Western |  (dropped)
       _cons |    13.9414   .4932744    28.26   0.000     12.96719    14.91562
------------------------------------------------------------------------------


. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of L_P

        chi2(1)      =      1.11
        Prob > chi2  =    0.2923
```

```
Regression with robust standard errors          Number of obs =      173
                                                 F( 13,   159) =    21.12
                                                 Prob > F      =   0.0000
                                                 R-squared     =   0.5862
                                                 Root MSE      =   1.4568

------------------------------------------------------------------------------
             |               Robust
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  (dropped)
         D99 | -.0827793   .3830976    -0.22   0.829    -.8393957     .673837
         D00 |   .427421   .3702049     1.15   0.250    -.3037323    1.158574
         D01 |  .5224144    .41216      1.27   0.207    -.2915999    1.336429
         D02 | -.0239696   .4003297    -0.06   0.952    -.8146191      .76668
         D03 | -.9207968   .4831516    -1.91   0.058    -1.875019    .0334258
         D04 |  .7073962   .4836101     1.46   0.146    -.2477319    1.662524
          FA |  6.25e-09   1.70e-09     3.66   0.000     2.88e-09    9.61e-09
         STL | -1.62e-09   8.19e-10    -1.98   0.050    -3.24e-09   -2.08e-12
          NS |  4.69e-09   1.26e-09     3.73   0.000     2.21e-09    7.17e-09
          D1 |  (dropped)
          D2 |  .3578398    .29474      1.21   0.227    -.2242707    .9399502
          D3 |  1.118095   .3122737     3.58   0.000     .5013555    1.734834
          D4 |  2.424335   .4328483     5.60   0.000     1.569461    3.279209
  D_Domestic | -.8676835   .2610842    -3.32   0.001    -1.383324   -.3520431
   D_Western |  (dropped)
        _cons |   13.9414   .4453708    31.30   0.000      13.0618    14.82101
------------------------------------------------------------------------------
```

Appendix 4. Dependent variable – logarithm of price.

```
  Source |       SS       df       MS              Number of obs =     173
---------+------------------------------           F( 14,   158) =   15.41
   Model | 470.728867    14  33.6234905            Prob > F      =  0.0000
Residual | 344.789101   158   2.1822095            R-squared     =  0.5772
---------+------------------------------           Adj R-squared =  0.5398
   Total | 815.517968   172  4.74138354            Root MSE      =  1.4772


------------------------------------------------------------------------------
     L_P |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
     D98 |  (dropped)
     D99 | -.0370032   .4496549    -0.08   0.935    -.9251131    .8511066
     D00 |   .407619   .4357328     0.94   0.351    -.4529933    1.268231
     D01 |  .4842101    .447322     1.08   0.281    -.3992921    1.367712
     D02 | -.0251944   .4703449    -0.05   0.957    -.9541689    .9037801
     D03 | -.8011175   .4549617    -1.76   0.080    -1.699709    .0974737
     D04 |  .8784222   .5244747     1.67   0.096    -.1574636    1.914308
      FA |  6.15e-09   1.27e-09     4.85   0.000     3.65e-09    8.65e-09
      NS |  4.49e-09   1.01e-09     4.46   0.000     2.50e-09    6.48e-09
     STL | -1.53e-09   1.05e-09    -1.45   0.148    -3.61e-09    5.49e-10
    D_25 | -.9554781   .3934154    -2.43   0.016     -1.73251   -.1784464
 D_25_50 | -.6150881   .3453265    -1.78   0.077     -1.29714    .0669634
 D_50_60 |  (dropped)
D_60_100 |  1.040501   .3923107     2.65   0.009     .2656516    1.815351
   D_DOM | -.9358337   .5250822    -1.78   0.077    -1.972919    .1012519
  D_WEST |  .0071386   .5924592     0.01   0.990    -1.163023      1.1773
D_Offshore |  (dropped)
    _cons |  14.96626   .6552288    22.84   0.000     13.67213     16.2604
------------------------------------------------------------------------------
```

. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of L_P

        chi2(1)   =   0.88
        Prob > chi2 =   0.3473

Appendix 5. Dependent variable – logarithm of price.

```
Source |       SS       df       MS              Number of obs =     173
-------------+------------------------------         F( 14,   158) =   15.88
       Model |  476.711624    14  34.0508303         Prob > F      =  0.0000
    Residual |  338.806344   158  2.14434395         R-squared     =  0.5846
-------------+------------------------------         Adj R-squared =  0.5477
       Total |  815.517968   172  4.74138354         Root MSE      =  1.4644


------------------------------------------------------------------------------
         L_P |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          FA |   6.29e-09   1.25e-09     5.02   0.000     3.82e-09    8.76e-09
         STL |  -1.60e-09   1.04e-09    -1.54   0.127    -3.66e-09    4.58e-10
          NS |   4.65e-09   9.97e-10     4.67   0.000     2.69e-09    6.62e-09
         D98 |  (dropped)
         D99 |  -.0567594   .4458799    -0.13   0.899    -.9374132    .8238944
         D00 |   .4107723   .4309683     0.95   0.342    -.4404299    1.261974
         D01 |   .4694985   .4429504     1.06   0.291    -.4053693    1.344366
         D02 |  -.0628007   .4670115    -0.13   0.893    -.9851914     .85959
         D03 |  -.9295247   .4540862    -2.05   0.042    -1.826387   -.0326628
         D04 |   .6819674   .5248252     1.30   0.196    -.3546106    1.718545
   D_Domestic |  -.8055042   .3203341    -2.51   0.013    -1.438194   -.1728148
   D_Western |  (dropped)
   Dum_25_50 |   .3837235   .3071201     1.25   0.213    -.2228669    .9903139
   Dum_50_60 |   1.039367   .3931484     2.64   0.009     .2628629    1.815872
   Dum_60_75 |   1.339789   .4724096     2.84   0.005     .4067367    2.272842
  Dum_75_100 |   2.464249   .4243035     5.81   0.000      1.62621    3.302287
        _cons |    13.8779   .4904528    28.30   0.000     12.90921    14.84659
------------------------------------------------------------------------------
```

```
. hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of L_P


        chi2(1)      =      1.21
        Prob > chi2  =    0.2717
```

Appendix 6.1. Dependent variable – logarithm of price.

```
Regression with robust standard errors            Number of obs =     173
                                                  F( 13,   159) =   20.25
                                                  Prob > F      =  0.0000
                                                  R-squared     =  0.5965
                                                  Root MSE      =  1.4386


-------------------------------------------------------------------------
             |               Robust
         L_P |    Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
-------------+-----------------------------------------------------------
         D98 |  (dropped)
         D99 | -.0959394   .4175944   -0.23   0.819   -.9206867    .728808
         D00 |  .5425319    .371833    1.46   0.147   -.1918369   1.276901
         D01 |  .6832649   .4227231    1.62   0.108   -.1516115   1.518141
         D02 |  .0538592   .4158922    0.13   0.897   -.7675263   .8752446
         D03 | -.7775363   .4991209   -1.56   0.121   -1.763298   .2082256
         D04 |  .8388224   .4750338    1.77   0.079   -.0993676   1.777012
          TA |  5.73e-09   1.60e-09    3.58   0.000    2.56e-09   8.89e-09
         STL | -6.47e-09   1.50e-09   -4.33   0.000   -9.43e-09  -3.52e-09
          NS |  3.99e-09   1.56e-09    2.56   0.012    9.08e-10   7.07e-09
          D1 |  (dropped)
          D2 |  .4634005   .3004349    1.54   0.125   -.1299573   1.056758
          D3 |  1.309774   .3074732    4.26   0.000    .7025151   1.917032
          D4 |  2.363572   .4117092    5.74   0.000    1.550448   3.176696
  D_Domestic | -.9999062   .2621574   -3.81   0.000   -1.517666  -.4821464
   D_Western |  (dropped)
        _cons |  13.86401   .4480027   30.95   0.000    12.97921   14.74882
-------------------------------------------------------------------------
```

Appendix 6.2. Dependent variable – logarithm of price.

```
Regression with robust standard errors            Number of obs =     173
                                                  F( 13,   159) =   19.80
                                                  Prob > F      =  0.0000
                                                  R-squared     =  0.5876
                                                  Root MSE      =  1.4544


-------------------------------------------------------------------------
             |               Robust
         L_P |    Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
-------------+-----------------------------------------------------------
         D98 |  (dropped)
         D99 | -.0469206   .4263365   -0.11   0.913   -.8889336   .7950924
         D00 |  .5597823   .3641198    1.54   0.126   -.1593529   1.278918
         D01 |  .7088098   .4288334    1.65   0.100   -.1381346   1.555754
         D02 |  .0813898   .4209826    0.19   0.847   -.7500493   .9128289
         D03 | -.8204789   .4957199   -1.66   0.100   -1.799524   .1585661
         D04 |  .8282281   .4718104    1.76   0.081   -.1035957   1.760052
          NW |  5.47e-09   1.57e-09    3.49   0.001    2.37e-09   8.57e-09
         STL | -7.86e-10   6.82e-10   -1.15   0.251   -2.13e-09   5.61e-10
          NS |  4.60e-09   1.51e-09    3.05   0.003    1.62e-09   7.58e-09
          D1 |  (dropped)
          D2 |  .4442107   .3032444    1.46   0.145   -.1546959   1.043117
          D3 |  1.312626   .3127266    4.20   0.000    .6949922    1.93026
          D4 |   2.38139   .4207262    5.66   0.000    1.550457   3.212323
  D_Domestic | -1.011565   .2723631   -3.71   0.000   -1.549481   -.473649
   D_Western |  (dropped)
        _cons |  13.90186   .4585613   30.32   0.000    12.99621   14.80752
-------------------------------------------------------------------------
```

Appendix 7. Dependent variable – logarithm of price.

```
Regression with robust standard errors            Number of obs =      173
                                                  F( 12,   160) =    17.30
                                                  Prob > F      =   0.0000
                                                  R-squared     =   0.5590
                                                  Root MSE      =   1.4992

------------------------------------------------------------------------------
             |               Robust
        L_P  |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        D98  |   (dropped)
        D99  | -.2560854   .4953407    -0.52   0.606    -1.234335    .7221637
        D00  |  .2844835   .4093272     0.70   0.488    -.5238974    1.092864
        D01  |  .2097016   .4478217     0.47   0.640    -.6747022    1.094105
        D02  | -.4148986    .439844    -0.94   0.347    -1.283547     .45375
        D03  | -1.156122    .46278     -2.50   0.013    -2.070067   -.242177
        D04  |  .5920941   .4838302     1.22   0.223    -.3634229    1.547611
         NS  |  4.15e-09   1.37e-09     3.02   0.003     1.44e-09    6.87e-09
     Workers |   .000147   .0000338     4.35   0.000     .0000802    .0002138
         D1  |   (dropped)
         D2  |  .3585407   .2906182     1.23   0.219    -.2154017    .9324831
         D3  |  1.136602   .3150311     3.61   0.000     .5144466    1.758758
         D4  |  2.342512   .4428354     5.29   0.000     1.467956    3.217068
  D_Domestic | -1.028248   .3030945    -3.39   0.001     -1.62683   -.4296665
   D_Western |   (dropped)
       _cons |  14.36676   .5182802    27.72   0.000     13.34321    15.39031
------------------------------------------------------------------------------
```

Appendix 8. Dependent variable – logarithm of price.

```
Regression with robust standard errors            Number of obs =     173
                                                  F( 12,  160) =   16.43
                                                  Prob > F      =  0.0000
                                                  R-squared     =  0.5270
                                                  Root MSE      =  1.5526

------------------------------------------------------------------------------
             |              Robust
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  (dropped)
         D99 |  -.0830359    .384522    -0.22   0.829    -.8424289    .6763571
         D00 |   .2814542   .3664681     0.77   0.444    -.4422841    1.005193
         D01 |     .53676    .430617     1.25   0.214    -.3136662    1.387186
         D02 |  -.1011241   .3958761    -0.26   0.799    -.8829404    .6806922
         D03 |    -.77467   .5542365    -1.40   0.164    -1.869232    .3198925
         D04 |    .667185   .4909441     1.36   0.176    -.3023814    1.636751
  Productivi~S |   3.02e-07   1.78e-07     1.70   0.091    -4.89e-08    6.53e-07
          FA |   9.44e-09   1.37e-09     6.90   0.000     6.74e-09    1.21e-08
          D1 |  (dropped)
          D2 |   .2102301    .337294     0.62   0.534    -.4558924    .8763525
          D3 |   .9547613   .3479206     2.74   0.007     .2676523     1.64187
          D4 |   2.202857   .4723356     4.66   0.000     1.270041    3.135673
   D_Domestic |  -.7818008   .2782604    -2.81   0.006    -1.331338   -.2322639
    D_Western |  (dropped)
        _cons |   14.06832   .4615079    30.48   0.000     13.15689    14.97975
------------------------------------------------------------------------------
```

Appendix 9. Dependent variable – net government revenue.

```
      Source |       SS           df       MS              Number of obs =     173
-------------+------------------------------              F( 41,   131) =    2.72
       Model |  2.0504e+17         41  5.0010e+15          Prob > F      =  0.0000
    Residual |  2.4115e+17        131  1.8409e+15          R-squared     =  0.4595
-------------+------------------------------              Adj R-squared =  0.2904
       Total |  4.4620e+17        172  2.5942e+15          Root MSE      =  4.3e+07

------------------------------------------------------------------------------
         NGR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          TA |   .3554603   .8233551     0.43   0.667    -1.273332    1.984253
          FA |  -.4669929   .1018995    -4.58   0.000    -.6685744   -.2654113
          NW |  -.0165644   .8158266    -0.02   0.984    -1.630464    1.597335
          NP |  -.6498697   .2878252    -2.26   0.026    -1.219257   -.0804828
         SBD |   .7637679   .3453338     2.21   0.029     .0806151    1.446921
       OLTFL |   .4174469   .6514304     0.64   0.523    -.8712378    1.706132
         LTL |  -.2384584   .8760873    -0.27   0.786    -1.971568    1.494651
         STL |  -.3235693    .822064    -0.39   0.695    -1.949808    1.302669
          NS |    .226048   .1732382     1.30   0.194    -.1166584    .5687544
          CS |    .153529   .1777332     0.86   0.389    -.1980696    .5051276
       Depth |    7.37e+07   5.43e+07     1.36   0.177    -3.37e+07    1.81e+08
     Workers |  -7228.971   2401.728    -3.01   0.003    -11980.16   -2477.781
         D98 |  (dropped)
         D99 |    1.75e+07   1.60e+07     1.09   0.277    -1.42e+07    4.92e+07
         D00 |    3.43e+07   1.47e+07     2.34   0.021      5289944    6.33e+07
         D01 |    3.80e+07   1.46e+07     2.61   0.010      9219872    6.69e+07
         D02 |    3.00e+07   1.61e+07     1.86   0.065     -1845472    6.19e+07
         D03 |    1.49e+07   1.55e+07     0.96   0.338    -1.57e+07    4.55e+07
         D04 |    4.86e+07   1.90e+07     2.55   0.012     1.10e+07    8.62e+07
   Cap_Intens |  -32.76632    118.069    -0.28   0.782     -266.335    200.8024
  NW_per_Labor |  69.86779   140.6436     0.50   0.620    -208.3589    348.0944
  Productivi~P |  337.5773   255.2289     1.32   0.188    -167.3263    842.4808
  Productivi~S | -365.1715   225.8644    -1.62   0.108    -811.9851    81.64214
          D1 |  (dropped)
          D2 |  -1.03e+07   1.11e+07    -0.93   0.355    -3.24e+07    1.17e+07
          D3 |  -2.76e+07   2.13e+07    -1.29   0.198    -6.98e+07    1.46e+07
          D4 |  -3.22e+07   3.50e+07    -0.92   0.360    -1.01e+08    3.72e+07
    D_Energy |  -7.74e+07   5.98e+07    -1.30   0.198    -1.96e+08    4.08e+07
    D_Mining |  -5.06e+07   5.46e+07    -0.93   0.356    -1.59e+08    5.75e+07
    D_Metals |  -6.20e+07   5.47e+07    -1.13   0.259    -1.70e+08    4.62e+07
 D_Construc~n |  -8.09e+07   5.45e+07    -1.48   0.140    -1.89e+08    2.69e+07
  D_MBuilding |  -9.07e+07   5.33e+07    -1.70   0.091    -1.96e+08    1.48e+07
  D_Chemistry |  -8.47e+07   5.58e+07    -1.52   0.131    -1.95e+08    2.57e+07
    D_Oil_Gas |  -9.93e+07   5.57e+07    -1.78   0.077    -2.10e+08    1.09e+07
      D_Food |  -8.35e+07   5.97e+07    -1.40   0.164    -2.02e+08    3.45e+07
     D_Trade |  -7.43e+07   5.79e+07    -1.28   0.202    -1.89e+08    4.03e+07
     D_Paper |  -7.54e+07   5.59e+07    -1.35   0.180    -1.86e+08    3.51e+07
 D_Transpor~n |  -7.60e+07   5.71e+07    -1.33   0.185    -1.89e+08    3.69e+07
      D_Cars |  -1.18e+08   5.77e+07    -2.05   0.043    -2.32e+08   -3895622
    D_Tourism |  -1.06e+08   5.99e+07    -1.77   0.078    -2.25e+08    1.22e+07
    D_Finance |  (dropped)
       D_Ukr |  -8030067   1.08e+07    -0.74   0.459    -2.94e+07    1.33e+07
      D_West |  (dropped)
      D_East |   1731204   3.16e+07     0.05   0.956    -6.07e+07    6.42e+07
          GM |  (dropped)
  CS_per_Wor~r | -368.2086   235.557    -1.56   0.120    -834.1966    97.77936
       _cons |    4.56e+07   5.85e+07     0.78   0.437    -7.01e+07    1.61e+08
------------------------------------------------------------------------------
```

Appendix 10. Dependent variable – net government revenue.

```
Regression with robust standard errors          Number of obs =     173
                                                F( 40,   131) =       .
                                                Prob > F      =       .
                                                R-squared     =  0.4595
                                                Root MSE      =  4.3e+07

------------------------------------------------------------------------------
             |               Robust
         NGR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          TA |   .3554603   .8430641     0.42   0.674    -1.312322    2.023242
          FA |  -.4669929   .2931732    -1.59   0.114    -1.046959    .1129736
          NW |  -.0165644   .7565199    -0.02   0.983    -1.513141    1.480012
          NP |  -.6498697   .5515979    -1.18   0.241    -1.741062    .4413226
         SBD |   .7637679    .349052     2.19   0.030     .0732598    1.454276
       OLTFL |   .4174469   .8760711     0.48   0.635    -1.315631    2.150525
         LTL |  -.2384584   .6881596    -0.35   0.730    -1.599802    1.122886
         STL |  -.3235693   .8078246    -0.40   0.689    -1.921639      1.2745
          NS |    .226048   .3218141     0.70   0.484    -.4105771     .862673
          CS |    .153529   .3151783     0.49   0.627    -.4699689    .7770269
       Depth |   7.37e+07   5.48e+07     1.34   0.181     -3.47e+07    1.82e+08
     Workers |  -7228.971   5434.579    -1.33   0.186    -17979.86    3521.922
         D98 |  (dropped)
         D99 |   1.75e+07   1.19e+07     1.47   0.143     -5974049    4.09e+07
         D00 |   3.43e+07   1.77e+07     1.94   0.055    -690074.5    6.92e+07
         D01 |   3.80e+07   1.79e+07     2.12   0.036      2547410    7.35e+07
         D02 |   3.00e+07   1.57e+07     1.92   0.057    -966711.1    6.11e+07
         D03 |   1.49e+07   1.28e+07     1.16   0.248     -1.05e+07    4.02e+07
         D04 |   4.86e+07   2.54e+07     1.91   0.058     -1658468    9.88e+07
   Cap_Intens |  -32.76632   121.1344    -0.27   0.787    -272.3991    206.8665
 NW_per_Labor |   69.86779   168.3203     0.42   0.679    -263.1099    402.8455
  Productivi~P |   337.5773   345.8787     0.98   0.331    -346.6533    1021.808
  Productivi~S |  -365.1715   273.6042    -1.33   0.184    -906.4259    176.0829
          D1 |  (dropped)
          D2 |  -1.03e+07   1.24e+07    -0.83   0.406     -3.49e+07    1.42e+07
          D3 |  -2.76e+07   2.06e+07    -1.34   0.183     -6.83e+07    1.32e+07
          D4 |  -3.22e+07   3.15e+07    -1.02   0.309     -9.44e+07    3.01e+07
    D_Energy |  -7.74e+07   8.03e+07    -0.96   0.337     -2.36e+08    8.15e+07
    D_Mining |  -5.06e+07   5.87e+07    -0.86   0.390     -1.67e+08    6.54e+07
    D_Metals |  -6.20e+07   5.97e+07    -1.04   0.301     -1.80e+08    5.61e+07
 D_Construc~n |  -8.09e+07   6.37e+07    -1.27   0.206     -2.07e+08    4.50e+07
  D_MBuilding |  -9.07e+07   6.80e+07    -1.33   0.185     -2.25e+08    4.39e+07
  D_Chemistry |  -8.47e+07   6.98e+07    -1.21   0.227     -2.23e+08    5.35e+07
    D_Oil_Gas |  -9.93e+07   7.18e+07    -1.38   0.169     -2.41e+08    4.27e+07
      D_Food |  -8.35e+07   7.00e+07    -1.19   0.235     -2.22e+08    5.50e+07
     D_Trade |  -7.43e+07   6.36e+07    -1.17   0.245     -2.00e+08    5.15e+07
     D_Paper |  -7.54e+07   6.57e+07    -1.15   0.253     -2.05e+08    5.45e+07
 D_Transpor~n |  -7.60e+07   6.72e+07    -1.13   0.260     -2.09e+08    5.69e+07
      D_Cars |  -1.18e+08   7.60e+07    -1.55   0.123     -2.68e+08    3.22e+07
   D_Tourism |  -1.06e+08   7.52e+07    -1.41   0.160     -2.55e+08    4.25e+07
   D_Finance |  (dropped)
       D_Ukr |  -8030067   1.04e+07    -0.77   0.442     -2.86e+07    1.26e+07
      D_West |  (dropped)
       D_East |   1731204   1.78e+07     0.10   0.923     -3.34e+07    3.69e+07
          GM |  (dropped)
   CS_per_Wor~r |  -368.2086   271.5942    -1.36   0.178    -905.4867    169.0695
        _cons |   4.56e+07   5.85e+07     0.78   0.437     -7.00e+07    1.61e+08
------------------------------------------------------------------------------
```

Appendix 11. Dependent variable – net government revenue.

```
Regression with robust standard errors                Number of obs =     173
                                                      F( 23,  149) =    7.80
                                                      Prob > F     =  0.0000
                                                      R-squared    =  0.3679
                                                      Root MSE     =  4.4e+07


------------------------------------------------------------------------------
             |               Robust
         NGR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          TA | -.0288937   .6506838    -0.04   0.965    -1.314653    1.256866
          FA | -.3878673      .2763    -1.40   0.162    -.9338398    .1581051
          NW |  .2765234    .564086     0.49   0.625    -.8381179    1.391165
          NP | -.3118698   .360656     -0.86   0.389    -1.024531    .4007912
         SBD |  .6580587   .338121      1.95   0.054    -.0100728     1.32619
       OLTFL |  .0904115   .6085507     0.15   0.882    -1.112093    1.292916
         LTL |  .0491498   .5163106     0.10   0.924    -.9710867    1.069386
         STL |  .0368401   .6202671     0.06   0.953    -1.188816    1.262496
          NS |   .196079   .3218387     0.61   0.543    -.4398786    .8320366
          CS |  .0943657    .311553     0.30   0.762    -.5212672    .7099985
       Depth |  3.52e+07   3.85e+07     0.91   0.363    -4.09e+07    1.11e+08
     Workers | -5421.535   4165.316    -1.30   0.195    -13652.26    2809.185
         D98 | (dropped)
         D99 |  1.03e+07   1.06e+07     0.97   0.333    -1.06e+07    3.12e+07
         D00 |  2.98e+07   1.75e+07     1.71   0.090    -4727366     6.44e+07
         D01 |  3.73e+07   1.61e+07     2.31   0.022     5463265     6.92e+07
         D02 |  2.86e+07   1.63e+07     1.75   0.083    -3737232     6.09e+07
         D03 |  1.94e+07   1.28e+07     1.52   0.130    -5770457     4.47e+07
         D04 |  5.54e+07   3.25e+07     1.70   0.090    -8837716     1.20e+08
          D1 | (dropped)
          D2 |  -6262622    9865460    -0.63   0.527    -2.58e+07    1.32e+07
          D3 | -1.52e+07   1.47e+07    -1.03   0.305    -4.43e+07    1.39e+07
          D4 | -1.04e+07   2.23e+07    -0.47   0.642    -5.45e+07    3.37e+07
  D_Domestic |  -5659379    8073607    -0.70   0.484    -2.16e+07    1.03e+07
   D_Western | (dropped)
          GM | (dropped)
 CS_per_Wor~r |  5.749003   9.123046     0.63   0.530    -12.27826    23.77626
        _cons | -2.62e+07   1.71e+07    -1.53   0.128    -6.00e+07     7602659
------------------------------------------------------------------------------
```

.

Appendix 12. Dependent variable – logarithm of price.

```
Source |       SS       df       MS              Number of obs =     173
-------------+------------------------------         F( 19,   153) =   12.83
       Model |  501.032245    19  26.3701182         Prob > F      =  0.0000
    Residual |  314.485723   153  2.05546224         R-squared     =  0.6144
-------------+------------------------------         Adj R-squared =  0.5665
       Total |  815.517968   172  4.74138354         Root MSE      =  1.4337


------------------------------------------------------------------------------
        L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         FA |   6.00e-09   1.24e-09     4.82   0.000     3.54e-09    8.45e-09
         NS |   4.61e-09   9.83e-10     4.69   0.000     2.66e-09    6.55e-09
        STL |  -1.96e-09   1.04e-09    -1.87   0.063    -4.02e-09    1.06e-10
        D98 |  (dropped)
        D99 |   .2644674   .4834957     0.55   0.585    -.6907221    1.219657
        D00 |    .690926   .4658631     1.48   0.140    -.2294287    1.611281
        D01 |   .6844043   .4418424     1.55   0.123    -.1884953    1.557304
        D02 |   .2987335    .489687     0.61   0.543    -.6686874    1.266154
        D03 |  -.5985177    .479579    -1.25   0.214    -1.545969     .348934
        D04 |   1.131147   .5545925     2.04   0.043     .0354994    2.226795
 D_Domestic |  -.6655991   .3251522    -2.05   0.042    -1.307967   -.0232315
  D_Western |  (dropped)
  Dum_25_50 |    .324399   .3047867     1.06   0.289    -.2777346    .9265325
  Dum_50_60 |   .9867531   .3863596     2.55   0.012     .2234648    1.750041
  Dum_60_75 |   1.075216   .4723787     2.28   0.024     .1419896    2.008443
 Dum_75_100 |   2.285494   .4250031     5.38   0.000     1.445862    3.125126
  D_HeavyInd |  -.0463684   .4638547    -0.10   0.921    -.9627553    .8700185
  D_LightInd |  (dropped)
D_Trade_Fi~e |  -1.081223   .8035872    -1.35   0.180    -2.668782    .5063364
 D_Services |  -.9179414   .5956702    -1.54   0.125    -2.094742    .2588589
 D_Chemical |   .3186683   .5132737     0.62   0.536    -.6953503    1.332687
   D_Energy |   .8664382   .6770737     1.28   0.203    -.4711821    2.204059
       _cons |   13.61265   .6709181    20.29   0.000     12.28719    14.93811
------------------------------------------------------------------------------
```

Appendix 13. Dependent variable – logarithm of price.

```
      Source |       SS       df       MS              Number of obs =     172
-------------+------------------------------           F( 14,   157) =   16.32
       Model |  465.886058     14  33.2775756           Prob > F      =  0.0000
    Residual |  320.124461    157  2.03900931           R-squared     =  0.5927
-------------+------------------------------           Adj R-squared =  0.5564
       Total |   786.01052    171  4.59655275           Root MSE      =  1.4279


------------------------------------------------------------------------------
         L_P |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         D98 |  -.4554182   .5172165    -0.88   0.380    -1.477019    .5661823
         D99 |  -.4987283   .5087106    -0.98   0.328    -1.503528    .5060714
         D00 |  -.0197234   .4643316    -0.04   0.966    -.9368661    .8974193
         D01 |   .0604188   .4931319     0.12   0.903      -.91361    1.034448
         D02 |  -.4808294   .4947367    -0.97   0.333    -1.458028     .496369
         D03 |  -1.324133   .4739397    -2.79   0.006    -2.260253   -.3880122
         D04 |  (dropped)
          FA |   6.54e-09   1.22e-09     5.34   0.000     4.12e-09    8.96e-09
          NS |   4.66e-09   9.72e-10     4.80   0.000     2.74e-09    6.58e-09
         STL |  -1.66e-09   1.02e-09    -1.63   0.104    -3.67e-09    3.47e-10
  D_Domestic |  -.8110835   .3123727    -2.60   0.010    -1.428079   -.1940882
   D_Western |  (dropped)
   Dum_25_50 |   .4158803   .2996703     1.39   0.167    -.1760252    1.007786
   Dum_50_60 |   1.083611   .3836493     2.82   0.005     .3258307     1.84139
   Dum_60_75 |   1.360413    .460711     2.95   0.004     .4504219    2.270405
  Dum_75_100 |   2.334066   .4159802     5.61   0.000     1.512426    3.155705
       _cons |   14.28156   .6093129    23.44   0.000     13.07805    15.48506
------------------------------------------------------------------------------
```

Appendix 14. Ramsey omitted variables test.

```
Ramsey RESET test using powers of the fitted values of L_P
      Ho:  model has no omitted variables
                 F(3, 154) =      7.10
                  Prob > F =      0.0002
```

Appendix 15. Wald test for joint significance.

```
. test  D_HeavyInd D_LightInd D_Trade_Finance D_Services D_Chemical D_Energy

( 1)  D_HeavyInd = 0
( 2)  D_LightInd = 0
( 3)  D_Trade_Finance = 0
( 4)  D_Services = 0
( 5)  D_Chemical = 0
( 6)  D_Energy = 0
      Constraint 3 dropped


      F(  5,   149) =    1.00
          Prob > F =    0.4225
```

. test D_HeavyInd D_LightInd D_Trade_Finance D_Services D_Chemical D_Energy