DO PRIVATIZED ENTERPRISES PERFORM BETTER THAN STATE-OWNED ONES IN UKRAINE?

By

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Abstract

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This paper investigates the impact of privatization on enterprises' financial and operating activity by conducting a comparative analysis between privatized and state-owned enterprises. Empirical research is based on a sample of 379 Ukrainian enterprises for the period of 1997 – 1999. Results of estimation indicate that privatization positively influences labor productivity and profitability of enterprises. However, its results are not immediate, they become evident over time.

In order to tackle the problem of potential endogeneity, instrumental variables estimation technique is used. Instruments used are financial indicators of firms' activity, which, according to Ukrainian legislation, are the basis on which state authorities make decisions about the expediency of privatization.

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GLOSSARY

Privatization. Partial or full transition of the property rights from public hands to private agents.

SOE (State-Owned Enterprise). Enterprise with more than 50% of shares belonging to the state.

JSC. Joint-Stock Company.

SPFU. State Property Fund of Ukraine

Derzhkomstat. The State Statistics Committee of Ukraine.

Chapter 1

INTRODUCTION

During the last decade, governments in countries of Eastern and Central Europe, as well as in CIS countries, have launched large-scale privatization programs. Privatization policy implies reducing the government's role in regulation of economic processes, and decline in the share of state property in the country's national wealth. This policy is considered to be one of the most important elements of transition from state to market economy (Sheshinski and Lopez-Calva, 1999; Megginson and Netter, 2000). Most policy advisors and academic economists suggest that privatization is the corner stone of the structural reforms, because it

- stimulates private sector development in the country;
- attracts FDI inflows;
- fosters competition;
- promotes liberalization of trade;
- favors the development of capital and product markets; and finally
- contributes to the development of stock markets and corporate governance systems.

Besides, it is argued that privatization significantly affects operating and financial performance of enterprises (Vickers and Yarrow, 1991; Megginson and Netter, 2000; Djankov and Murrel, 2000).

However, the empirical evidence on privatization in transition countries is quite contradictory. While number of research witnessed positive results of privatization (mainly in countries of Central Europe and the Baltic

States), there also exist some studies reporting weak correlation between privatization and improvements in firm performance.

For Ukraine, a large transitional country, little evidence has been presented so far. So, the following question remains of extreme interest for the research: how do Ukraine's privatized enterprises perform? Results of Ukrainian privatization cannot be called neither evident, nor definitely positive. Along with the launching of the stabilization program in the country in early 1990s, the Ukrainian government has made great efforts towards privatization (Paskhaver, 2000; Chechetov, 2000). Despite the fact that the relevant legislation[1] was adopted with ambitious privatization goals, the privatization process is not so speedy and successful as it was expected by many policy makers (IMF, 1999; EBRD, 1999). The reasons for that are quite common in transitional countries of the former USSR (World Bank, 1999). Complicated implementation procedures, inherited non-efficient structure of industries, enterprises accustomed to a state order system, weak incentives for profit maximizing behavior, non-transparency of the legal and business environment, and excessive bureaucracy in the highest bodies of power have all contributed to continued blockage of progress in privatization.

The following questions then arise naturally: does only privatization itself, i.e. transition of property rights, ensure improvement of the enterprise's efficiency? If not, then what factors besides the ownership determine enterprise performance? In this study we will try to evaluate the impact of ownership on operating efficiency of enterprises, while controlling for the influence of other factors, such as competition and hard budget constraints.

[1] The Law of Ukraine "On Privatization of the State Property", No. 2613-12, 4 March 1992, the Law of Ukraine "On Privatization Certificates", No. 2713-12, 6 March 1992. Presidential Decree "On Expedient Measures to Accelerate Privatization in Ukraine", No. 1626; December, 29, 1999.

For the purpose of the study, we will use the data available for the sample of 379 join-stock companies over the period starting from 1997 until 1999. The research focuses on joint-stock companies only (other types of enterprises are not included in the sample). However, we believe that this will not distort results in any significant way, since vast majority of privatized firms belongs to the category of collectively owned enterprises[2]. Firms of this group generate the lion's share of total output of Ukraine (68.8% as of January 1, 2000; Derzhkomstat, 2000). Information on decomposition of Ukraine's industrial output, employment and number of enterprises by ownership type is given in Table 1 (as of January, 2000)

The table presents four different types of ownership: state-owned enterprises, collectively-owned companies, private firms, and other forms of ownership. The first group, state-owned enterprises, mainly comprises those enterprises which are prohibited from privatization according to Ukrainian legislation. Their exclusion from the sample should not distort the results since our aim is to analyze privatization effects. Private firms are mostly *de-novo* created private entities, and are also excluded from our sample. The only group which is of interest to us is that of collectively-owned companies. It consists mainly of joint-stock companies — a group of which our sample is representative. JSCs may be separated into two categories: privatized companies, and SOEs which were incorporated but not privatized, i.e. 100% of shares belong to the state. Both categories are represented in the sample. Such sample structure allows us to accomplish the main task of the study — compare performance of privatized and state-owned enterprises, and analyze the impact of privatization on enterprises performance.

[2] According to UEPLAC (2001) definition, 'enterprises of "collective" ownership are enterprises (earlier leased with the right of buy-out) bought by workers or classical joint-stock companies (closed or open)'.

The paper is organized as follows. Chapter 2 covers the peculiarities of the Ukrainian process of privatization. Chapter 3 reports on different theoretical approaches to the problem. In Chapter 4, we will describe the sample and model specification, as well as regression results. In Chapter 5, we will sum up main findings of this research and will develop some policy implications.

Table 1. Relative Importance of Different Ownership Types.

	Ukraine (total)	Including:			
		tate-owned enterprises	ollectively owned ompanies	rivate firms	Other forms of ownership
Number of enterprises	10,527	1,495	8,837	145	50
%	100%	14.2%	83.9%	1.4%	0.5%
Employment (workers)	4,622,144	1,440,070	3,160,892	12,460	8,722
%	100%	31.1%	68.4%	0.03%	0.02%
Output (UAH million)	103,783.6	31,547.9	71,435.4	274.7	525.6
%	100%	30.4%	68.8%	0.3%	0.5%

Source: Derzhkomstat. 2000. *Main Performance Indicators of Enterprises of Some Branches of the Economy of Ukraine in 1999*. Statistics bulletin

Chapter 2

UKRAINIAN BACKGROUND

The process of privatization in Ukraine has begun in 1992, when Ukrainian Parliament approved the relevant legislation and the first State Privatization Program[3]. At that times privatization was the major item on the agenda of Ukrainian reformers — the first step in the process of transition to market economy (Yekhanurov, 2000). Political reasons were the primary determinants shaping privatization strategy. Low popularity of reforms among Ukrainians, the dominance of communist bureaucracy in the highest bodies of power, lack of private capital — all these seemed to contribute to the impossibility of "big-bang" reforms. Mass privatization approach was chosen in order to provide the fastest transfer of ownership from public to private hands, and to guarantee the irreversibility of transition reforms (Roland, 2000).

However, Ukrainian voucher privatization was carried out with substantial distortions, which caused some negative impact on the whole privatization process. The idea of a "fair" distribution of property rights among all citizens of Ukraine obviously could not help in implementing one of the primary goals of privatization — improving of enterprise efficiency. A diluted ownership structure which was formed as a result of mass privatization (Akimova and Schwödiauer, 2000; Yekhanurov, 2000) led to deteriorative effects on monitoring and incentives of managers. Employees and managers of enterprises were granted advantage in the privatization process, and this distortion has led to the emergence of so-called "insider"-

[3] Verkhovna Rada. The State Privatization Program for 1992. No. 2545-XII, July, 7, 1992

controlled firms[4] (Yekhanurov, 2000). Managers have little incentive to launch efficiency enhancing restructuring programs, fearing that this process will lead to lay-offs of workers (also shareholders). Furthermore, free circulation of privatization certificates was prohibited. Illegal forms of circulation have contributed to enlargement of the unofficial sector of economy (Paskhaver, 2000). Finally, overall bureaucratization of the mass privatization process and lack of transparency also blocked the successful reforms.

The goals of the next stage of privatization (cash sales or "privatization for money"), as declared in the State Privatization Program for 1999[5], are quite contradictory. On the one hand, State Property Fund of Ukraine (SPFU) should follow a policy of case-by-case privatization, or individual approach to each enterprise's privatization plan. In other words, when choosing the method of privatization and determining the price of an object, SPFU should take into account regional and sectoral peculiarities of an enterprise, market conditions in which it operates, its financial standing, etc. At the same time, it is declared in the Program that replenishment of the state budget is one of the main purposes for selling state enterprises. These two goals may often be conflicting, apparently.

Another one point that hinders privatization progress is worth mentioning: political constraints. Since the privatization start, seven governments and three convocations of the Parliament have alternated. After the parliament elections of 1994, when communists have won the considerable number of seats in Verkhovna Rada, privatization process slowed down significantly. Moratorium on privatization was imposed starting from July, 1994 till May,

[4] According to the survey of Institute of Reform and London Business School, insiders (employees, former employees, and managers) still own 55% of statutory funds of Ukrainian joint-stock companies, while outsiders own 35%. Remaining 10% belong to the state. (*Ukrainska Investytsiyna Gazeta*, September, 13, 2000).

[5] Verkhovna Rada. The State Privatization Program for 1999. No. 209/99, February, 24, 1999

1995. Plan to privatize almost 30,000 enterprises in 1994 was fulfilled by only a quarter (Yekhanurov, 2000). Besides, the Parliament issued a list of enterprises prohibited from privatization (number of enterprises in this list constantly grew[6]). Process of selection of enterprises was non-transparent and initiated primarily by the branch ministries which have these enterprises under jurisdiction. Besides, managers of enterprises often resisted privatization, because staying a state-owned enterprise offered a lot of privileges and benefits: fixed level of wages, stable employment, soft-budget constraints and state order providing stable demand on output.

Furthermore, there also exists a list of strategic enterprises[7]. Enterprises of this group are monopolists (hold at least 35% of product market[8]) or industrial giants. Since that time legislation concerning the status of these entities was changed several times. Nowadays they are subject to privatization, but the state retains blocking (25%+1) or controlling (50%+1) stake in them.

Actually, state still holds blocks of shares in more than 2,500 joint-stock companies (Chechetov, 2000). In 1116 JSCs it holds less than 25% of shares, in 1012 enterprises the state owns between 25% and 50% of shares, in 186 — 50%-75%, in 235 — 75%-100%.

Ukraine still has relatively high level of state interference in the economy. Despite the proclaimed statements about privatizing the economy (State

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[6] Resolution of Verkhovna Rada "List of Enterprises Prohibited from Privatization". No. 847-XIV, July, 7, 1999. Earlier versions: No. 334a/95, May, 1995; No. 542-96, November, 96; No. 203-98, March 98.

[7] Resolution of Verkhovna Rada "List of Enterprises that Have Strategic Importance for the Economy and State Security". No. 1346, August, 29, 2000. Earlier versions: No. 911, August, 21, 1997; No. 1151, July, 27, 1998; No. 801, May, 10, 1999; No. 1157, June, 29, 1999; No. 317, February, 16, 2000.

[8] Antimonopoly Committee Instruction "On Criteria for Defining an Enterprises as a Monopolist", No. 1-p, March, 10, 1994

Privatization Programs[9]), the Ukrainian government, in fact, does not move quickly with effective reforms. To summarize, we can outline some major features of Ukrainian privatization:

- mass privatization resulted in a widely dispersed ownership, which negatively influenced quality of monitoring, and consequently, incentives of managers;
- preferential buy-outs by workers' collectives led to insiders dominated ownership;
- state still owns large stakes in partially privatized enterprises;
- the whole privatization process can be characterized as non-transparent and bureaucratized.

[9] Such Privatization Programs were adopted for following periods: 1992, 1994, 1997, 1999, 2000-2002. In 1998 such Program were rejected by the Parliament.

Chapter 3

LITERATURE REVIEW

Literature examining privatization and its impact on enterprise activity is a subset of a larger group of literature which studies the proper scope of government in transition economies. The particular questions on which we concentrate in this paper is whether government should privatize firms and whether this policy ensures improvement in enterprise efficiency. Put in other words, we try to find out whether private ownership leads to improvements in enterprise performance.

Debates on the efficiency of private ownership versus state ownership continue. However, despite the strong confidence of many policy advisors, not only in Ukraine, but also in international research agencies, the benefits of privatization are not so obvious. Along with a great number of works confirming beneficial effects of privatization in transition countries (see Claessens and Djankov, 1998, 1999; Megginson et al., 1994; Grigorian, 1998) there exist some studies that are much more skeptical about positive influence of privatization (see Nellis, 1999; Frydman et al., 1998; Black et al., 2000).

A huge variety of theoretical and empirical literature discusses the impact of privatization (see Megginson and Netter (2000) for review). There can be distinguished several main approaches to explaining the difference between private and public ownership. According to the *social view*, state-owned enterprises can be less profitable because besides production activity, they can provide various social services to their workers, such as health care, housing, nursery, etc. These expenses can negatively influence

SOEs efficiency, and even cause them to be loss-making. Proponents of this approach argue that public ownership is used as a remedy to market failure, because government takes into account social marginal cost when it establishes pricing system in industries where markets fail (Shapiro and Willig, 1990; Sheshinski and Lopez-Calva, 1999).

According to the *political view*, managers of SOEs often can pursue their own targets, which can be incompatible with efficiency improvements (Sheshinski and Lopez-Calva, 1999). They may tend to maintain excess level of employment in exchange for political support from workers, whereas private managers have more incentives to pursue profit maximization. Public enterprises can be sensible to pressure from different government interest groups. Hence, managers of state-owned enterprises can face both distorted objectives and distorted constraints (soft budget constraints, first introduced by Kornai (1980)).

Apart from that, governments often tend to maximize their revenues from sale of SOEs. One way to achieve this goal is to restrict post-privatization competition, and therefore, to increase the value of an enterprise's future income stream. In other words, such type of privatization will lead to emergence of a private monopolist, which can hardly be called improving in efficiency. Another way is to distribute shares among different small owners as widely as possible. However, this would lead to a deteriorative effect on monitoring. These hypotheses were described by Vickers and Yarrow (1989). Yet another channel for distorting influence of government on privatization is suggested by Boycko, Shleifer and Vishny (1996). They look at government as if it is not homogenous. They argue that it is often a combination of reformers and traditionalists (particularly, in transition countries). While the reformers in a government may be able to push through a general privatization program, conservative officials successfully

prevent pre-privatization restructuring making the privatization process less effective, if not meaningless.

The *incentives view* describes how objectives of managers can be affected under different forms of ownership. Vickers and Yarrow (1989) suggest that SOE's managers may have poor incentives to run enterprises efficiently, or they may be inadequately monitored. Managers of public enterprises who are employed by the supervising body may have a shorter planning horizon — only for the time of their contract duration, while private owners taking into consideration a longer perspective have higher incentives for their business development. But nevertheless, in the absence of a developed institutional framework (as in case of transitional countries), planning horizon of private owners shortens and they tend to demonstrate speculative behavior. Besides, in the situation when the state holds the majority stake, it may provide proper monitoring even better than diluted private owners can. The other side of this approach concerns the penalties for inefficient activity. While private managers cannot rely on government help in the form of additional funding, and can go bankrupt, public enterprises are often bailed out in bad times (Phelps, 1992).

According to the next view, product-market *competition* is the primary source of difference in performance of enterprises. It is argued that if competition can equalize state and private enterprises performance, than there is no need to consider the nature of ownership. However, it should be determined whether SOEs would perform as well as private firms facing the same market structure, i.e. whether the effects of competition are primary to effects of ownership. In their study, Vickers and Yarrow (1989) identified information effect of competition as an important influence on public sector performance, but they do not quantify the effect relative to ownership. In contrast, Kay and Thomson (1986) argue that competition

must be combined with a credible threat of exit, bankruptcy or reduction in the market share imposed on managers as a penalty for inefficient management practices. Otherwise they will not have incentives to stimulate productivity of their enterprises. The only problem of such an argument is the difficulty of introduction of credible threats, especially in the country like Ukraine, where law enforcement is weak. Often competition is viewed as a substitute or a supplement to efficiency enhancing privatization program. Brown and Earle (2001) develop this theory and support it with empirical findings. They come to the conclusion that privatization and competitive environment are substitutes, but privatization of enterprise's rivals is complementary.

However, there exist some cases where competition is neither feasible nor desirable, for instance *natural monopoly.* Baumol (1977, p. 810) defines natural monopoly as '… an industry in which multiform production is more costly than production by a monopoly (cost subadditivity) …' or '… an industry to which entrants are not "naturally" attracted, and are incapable of survival even in the absence of "predatory" measures by the monopolist (sustainability)'. Examples of such industries are railways, communication, and utility services. Literature on this topic discusses whether state ownership or regulation of private monopoly will produce more efficient remedy to a market failure. Grossman and Hart (1986) note that results will depend on completeness of contracts. If the contracts are complete (define all aspects of operating and every possible eventuality), then both state monopoly and regulation of private monopoly will yield the same results. However, in real world one cannot foresee everything, and contracts are, as a rule, incomplete.

One possible solution in overcoming the problem of natural monopoly is offered by Demsetz (1968). He propose to foster competition through

bidding for the right to operate as a monopoly, employing the concept of contestable markets.

Claessens and Djankov (1998) claim that privatization is always associated with significant improvements in total factor productivity and reductions in excess employment. Hardening the budget constraints is accompanied by further productivity improvements. They base their work on Shleifer and Vishny's (1994, 1996) hypotheses concerning effects of privatization and stabilization on enterprises behavior. The sample includes 6,300 privatized and still state-owned enterprises in seven countries of Eastern and Central Europe. The results of statistical testing show positive effects of privatization under circumstances of relative macroeconomic stability and low level of corruption.

In their later work, Claessens and Djankov (1999) consider ownership concentration and its influence on corporate performance. They argue that more concentrated ownership corresponds to a higher labor productivity and profitability of enterprises. They also find that foreign investors will contribute more to a better firm performance than any other type of owners. Their empirical research is based on cross-sectional data of 706 Czech enterprises. In addition, Frydman, Gray, Hessel and Rapaczynski (1998) point out that effects of privatization are not similar across different types of firms. Moreover, effects on performance tend to vary when measured by different indicators. The authors emphasize the importance of outsider, as opposed to insider, control to improvements in corporate performance. Also, when privatization is effective its impact on revenue and cost structure of firms is not identical. Even if the revenue stimulating effect turns out to be significant, privatization can contribute nothing to cost reduction. This research is based on a sample of manufacturing enterprises from transition countries in Central Europe. Another work worth of mentioning is by Estrin and Rosevear (1999, p.

1132): it supports the hypothesis that ownership effects '…do not work through blanket privatization, but depend on particular dominant owners'.

However, Earle, Estrin and Leshchenko (1996), in work based on a large sample of Russian firms, do not find strong evidence of positive privatization impact on the enterprises behavior or performance. Possible explanations may be lack of time for restructuring, as well as dispersed ownership which does not allow shareholders to establish effective control. Harper (2000) finds that mass privatization of enterprises in the Czech Republic yielded disappointing results. Real sales, profitability, efficiency and employment declined dramatically. In addition, some authors suggest that privatization in Russia turned out to be a great failure (Black, 1999).

So, one can say that there is great ambiguity, in theory and empirical research, concerning relative merits and vices of ownership impact on enterprises performance. The current debates on privatization in transition countries are understandable in the light of government and market failures taking place in Ukraine as well as in Eastern and Central Europe and other former USSR countries. But final conclusions about the necessity of privatization should be made over a longer period of time, because the results of privatization may become evident only when the overall economic situation is stabilized, and a business environment favoring the development of private sector is created.

Chapter 4

DATA DESCRIPTION AND MODEL SPECIFICATION

4.1 Data description

The empirical analysis is based on a sample of 379 Ukrainian open joint-stock companies. Annual reports of enterprises for the period of 1997–1999 include balance sheets, income statements, information on ownership structure and number of employees. Data for estimation came from two sources. The first part of it, namely annual reports of enterprises for 1997 – 1998, is taken from the database provided by the Institute for Economic Research and Policy Consulting (IERPC). This dataset includes 1694 firms. The second part (namely, reports for 1999) comes from the reports available at the Securities and Stock Market State Commission (SSMSC) websites[10]. More than three thousand of enterprises' reports are available on-line. The sample consists of enterprises which provide their annual reports for all three years. The total number of observations in the panel is 1137. In Appendix A (Table A1) decomposition of the sample by sectors and owenrship types is presented.

The sample, however, may be subject to selection bias. First of all, only open joint-stock companies are required to make their annual reports publicly available. Data on closed JSCs and non-incorporated state-owned enterprises is inaccessible. Furthermore, the fact that some enterprises have been providing their reports only for one or two years (and therefore, are excluded from the sample) may also lead to certain distortions.

[10] http://www.ssmsc.gov.ua, http://www.pio.kiev.ua

Therefore, results of this study should be taken with caution, and cannot be applied to the whole set of Ukrainian enterprises.

We include in the sample only state-owned, partially privatized, and fully privatized enterprises. *De-novo* created private firms are excluded from the sample in order to capture particular effects of privatization on the activity of enterprises. Privatized enterprises in the sample (in which the state owns less than 50% shares) amount to 285 enterprises in 1997, 293 in 1998 and 336 in 1999 (75.1%, 77.3%, and 88.6% of total number of firms in the sample, respectively).

4.2 Model Specification

As a measure of performance, we used two indicators: labor productivity (measured as net sales per employee, *PERF*, adjusted by GDP deflator[11]), and profitability (measured as profits before taxes per sales, *PROFIT*). Wide use of the former indicator in empirical research is quite evident[12], but use of the latter needs some additional comments. We used profit before taxes, because the size of taxes and tax legislation are subject to numerous and frequent changes in Ukraine. Often they can change several times during a year. So, profit net of taxes will be affected significantly by the legislative activity of the parliament, and would not, therefore, capture the net results of enterprise's activity. Profit before taxes per sales (or profit margin), to our mind, would better describe how successfully enterprises operated in a given year. In other words, this indicator measures how many kopeks per hryvnia of sales go to profits or losses of an enterprise. Actually, this indicator has been used in previous empirical

[11] Source: *Ukrainian Economic Trends*, UEPLAC, January 2001

[12] The logic behind this is intuitive — privatized enterprises use labor more efficiently, and thus have higher productivity (Bevan et al., 1999).

researches (see Megginson et al., 1994; D'Souza and Megginson, 1999; Akimova and Schwödiauer, 2000).

As independent variables we used the regressors listed below:

Table 2. List of Regressors.

REGRESSORS	MEASUREMENT
WAGE	labor costs per employee (UAH thousand)
DEBT	debt to asset ratio
PRIV	ownership dummy variable (=1 if more than 50% of shares is privatized, = 0 otherwise)
CONC	ownership concentration (measured as the sum of squared blocks of shares)
TA	deferred tax arrears to total assets ratio
COMP	competition dummy variable (1 in the presence of competition, 0 otherwise)
TRADE	sector dummy for trade
CONST	sector dummy for construction
SERV	sector dummy for services
TRAN	sector dummy for transport
AGR	sector dummy for agriculture
Y	years since privatization (equals to zero if an enterprise is not privatized)
Y97	year dummy (=1 if in 1997, = 0 otherwise)
Y98	year dummy (=1 if in 1998, = 0 otherwise)

WAGE is the real wage (deflated by CPI[13]). This variable is expected to have a positive influence on both performance indicators — labor productivity and enterprise's profitability. In the first case, higher wage will create a motivation for workers to be more productive or will bring in higher productivity workers. In the second case, the higher the wage, the higher the marginal product of labor (based on the assumption of perfect competition and equality of marginal product of input and its per unit cost). Taking into account the fact that SOEs often have excess workers, marginal productivity of their employees is expected to be lower than that of private firms' employees.

DEBT is a leverage ratio which is included in the regression in order to capture some internal sources for performance variation. To some extent, it can reflect the quality of management, or the ability of managers to attract funds. This variable, however, may have a dual meaning. On the one hand, high debt to assets ratio testifies that a firm is successful in attracting external funding which then can be invested in some profitable projects, and, therefore, can have positive influence on performance. On the other hand, over-leverage of an enterprise can cause some ill-incentives for managers to invest in projects which are, in fact, deteriorating to enterprise performance. Besides, a high debt to assets ratio can lead to liquidity problems. So, the net impact on firm's productivity and profitability is ambiguous.

PRIV dummy is equal to one if more than 50% of shares are privatized, and equal to zero if more than (or exactly) 50% of shares belong to the state. According to Ukrainian legislation, 50%+1 block of shares represents a controlling stake. Such a stake allows the owner to play a crucial role in the decision-making process.

[13] Source: *Ukrainian Economic Trends*, UEPLAC, January 2001.

CONC is an ownership concentration variable. It is measured like the Hirschman-Herfindahl index, i.e. sum of squared blocks of shares belonging to a particular owner. This variable is expected to have positive correlation with performance indicators, both productivity and profitability. According to relevant theory and empirical researches, concentrated ownership yields better results (Pivovarsky, 2001). In order to capture privatization, in right-hand side of equation we use not just concentration values, but the product of ownership dummy variable and concentration. Therefore, we aim to find not just the impact of concentration on the performance of firms, but influence of *private* ownership concentration on enterprises' productivity and profitability.

The deferred tax arrears ratio (TA) is used in order to capture the effects of soft budget constraints. It is expected that state authorities (Tax Collecting Authority in this particular case) may bail out state-owned enterprises in bad times with the purpose of avoiding bankruptcy. Hence, the expected relationship with dependent variables is negative. It would be better to take into account also wage arrears, arrears to suppliers, direct and hidden subsidies from the government in order to measure softness of budget constraint more precisely. Unfortunately, this is not possible for this study, due to the lack of data.

The *COMP* dummy is used in order to control for competitive environment, which, in fact, disciplines enterprises, and therefore, improves their performance. However, in the case of the profitability equation estimation, this variable should actually have a negative sign: higher competition is associated with lower profits. Best proxy for the competitive environment is Hirschman-Herfindahl concentration ratios. Unfortunately, due to lack of data we cannot use these ratios in our

analysis. Values for *COMP* variables were derived from the reports of enterprises for 1999. We assume that structure of industries did not change considerably during three years, and therefore, we use 1999's data for two previous years also. Managers were asked to provide information on the number of competitors in their major products, intensity of competition (on a 4-point scale), and origins of competitors (domestic or foreign). However, these judgments are rather subjective. Managers of enterprises of the same industry report sometimes different levels of competition intensity. Besides, only 158 enterprises (or 41.6% of total number of enterprises in the sample) provided this information. Thus, we are not able to construct a quantitative measure of competition. On the basis of these reports we construct qualitative variables. We used two sets of dummies — *COMPD* for domestic competition (equals to one if at least one domestic competitor was indicated in the report), *COMPF* for foreign competition (equals to one if at least one foreign competitor was indicated in the report).

Sector dummies are used in order to control for industries' differences. Omitted variable is *MANUF* which includes manufacturing enterprises of cable, chemical, construction materials, electricity, food, glass and ceramics, light, machinery, metallurgy, mining, oil and gas, pharmaceuticals, tire repair, tobacco and wood industries. *TRADE* dummy equals one for enterprises of wholesale and retail trade. To the *CONST* group belong construction enterprises. *SERV* represents sector dummy for enterprises of procurement, research and development (R&D), telecommunication, tourism, and utilities. Transport firms are singled out in *TRAN* group. *AGR* stands for agricultural enterprises. For the full description of industrial distribution of enterprises, see Appendix A.

Y represents years since privatization. We consider an enterprise as privatized if more than 50% of its shares belong to private owners. Therefore, even if privatization process could have begun earlier, Y is equal to one in the next year after the state sold more than 50% of shares. For enterprises which are not privatized Y takes value of zero. This variable is expected to have positive influence on enterprise's performance. The intuition behind this is quite clear: restructuring of a firm needs time to be implemented, for instance, change of manager, reduction in the staff, or replacement of fixed assets. Therefore, in measuring the overall impact of privatization on enterprise performance we should take into account the influence of this variable.

Year dummies for years 1997 and 1998 are included to correct for changes in institutional environment and some economy-wide shocks (like financial crisis, elections to the Parliament, replacement of government, etc.) which happened during the year and affected enterprise performance. Base year is 1999.

Descriptive statistics on some variables used in our model are presented in Appendix A, Table A2.

Despite the fact that we have panel data, we cannot apply neither fixed effects, nor random effects models to our empirical analysis. Some of independent variables are constant over time which constraints us from using these models. Variation across enterprises of different industries is really large due to difference in methods and speed of privatization. While manufacturing enterprises were mainly privatized through sales of shares in stock markets, enterprises of agricultural sector were mostly privatized through worker buy-outs. The highest number of enterprises of food and light industries were sold during 1993 – 1994, while the speed of

privatization of trade and services enterprises reached its peak in 1996. Transport and utilities industries still remain mainly in public hands. Obviously, we cannot ignore this diversity between enterprises and should control for sectoral and timing differences.

Therefore, we will use model with common intercept. Equations to be estimated take the following form:

$$PERF_{it} = a + b_1 WAGE_{it} + b_2 DEBT_{it} + b_3 PRIV_{it} + b_4 PRIV_{it} * CONC_{it} + b_5 TA_{it} + b_6 COMPD_i + b_7 COMPF_i + b_8 TRADE_i + b_9 CONST_i + b_{10} SERV_i + b_{11} TRAN_i + b_{12} AGR_i + b_{13} Y_{it} + b_{14} Y97_{it} + b_{15} Y98_{it} + e_{it}$$

where i = index for ith firm ($i = 1, \ldots, 379$),

t = year index ($t = 1997, 1998, 1999$).

$$PROFIT_{it} = j + g_1 WAGE_{it} + g_2 DEBT_{it} + g_3 PRIV_{it} + g_4 PRIV_{it} * CONC_{it} + g_5 TA_{it} + g_6 COMPD_i + g_7 COMPF_i + g_8 TRADE_i + g_9 CONST_i + g_{10} SERV_i + g_{11} TRAN_i + g_{12} AGR_i + g_{13} Y_{it} + g_{14} Y97_{it} + g_{15} Y98_{it} + e_{it}$$

So, the hypotheses to be tested are the following (according with the performance measure):

Labor productivity

H_0: Privatization does not lead to an increase in labor productivity

H_1: It does lead to some improvements

Profitability

H_0: Privatization does not have any impact on profitability of the enterprise

H_1: It results in higher profitability

When estimating the effects of different types of ownership on the enterprise's performance, endogeneity may pose a problem (Bevan et al., 1999). This occurs when bilateral relationships exist between two variables — privatized enterprises perform better, and simultaneously, enterprises which perform better are chosen to be privatized first. In order to manage this problem of endogeneity, instrumental variables method of estimation

should be used. To perform this technique, we should find instruments — variables which are highly correlated with the endogenous regressor ($PRIV$ in this case), but does not correlate with the disturbance terms. As instruments, we can use some variables that predetermine the type of ownership of an enterprise, or, in other words, remove pre-privatization bias. For instance, according to Ukrainian legislation, the State Property Fund of Ukraine (SPFU) makes a decision concerning the expediency of privatization of a particular enterprise on the basis of analysis of its financial standing. If all financial indicators correspond to the levels demanded by law[14], and an enterprise is eligible for privatization, it will be privatized. Otherwise, SPFU takes some restructuring measures which should lead to improvement of financial indicators. We will use some of these indicators as instruments, namely:

- Current Ratio (should be >1) — INSRUMENT 1;
- Acid Test (0.6 – 0.8) — INSRUMENT 2;
- Quick Liquidity Ratio (>0, growing) — INSRUMENT 3;
- Net Working Capital (>0, growing) — INSRUMENT 4;
- Leverage: Net Worth to Total Assets (>0.5) — INSRUMENT 5;
- Leverage: Debt to Equity (<1, should be declining) — INSRUMENT 6;
- Net Working Capital to Gross working Capital (>0.1) — INSRUMENT 7;
- Working Capital Surplus Covered by Own Resources (>0, should be growing) — INSRUMENT 8.

[14] Order of Ministry of Finance and State Property Fund of Ukraine "Regulations for Performing Analysis of Financial Stance of Enterprises that Are Subject to Privatization", No.49/121, February 26, 2001.

The way these instruments were calculated is demonstrated in Appendix B.

Technically, a particular dummy variable INS_j (j = 1, …, 8) will be equal to one, if value of the indicator meets the specified requirements, zero otherwise. Then we regress ownership dummy on the regressors just mentioned, and obtain fitted values for $PRIV$. Since $PRIV$ and ratios' dummies are dichotomous variables, we will use the Probit estimation technique. In other words, instrumental dummies will jointly determine the probability for enterprise to be privatized. Results of first stage estimation for instrumental variable approach is presented in Appendix B, Table B1. Fitted values from this regression will be then substituted instead of the dummy variable $PRIV$ into the target regressions. We also have to check these instruments for validity. Results of over-identifying restriction tests are provided in the Appendix C, Tables C1 and C2.

In order to manage possible problem of heteroscedasticity stemming from apparent heterogeneity of enterprises in the sample we employ cross-section weights.

Therefore, we will present two sets of estimated coefficients corresponding to two types of estimation techniques: generalized least squares with cross-section weights (GLS) and instrumental variables approach (IV).

4.3 Estimation results

Estimation results are presented in Table 3 and Table 4 below. In the columns are shown the results of two estimation techniques — GLS and Instrumental Variable (IV).

In Table 3 estimation results for dependent variable *PERF* (labor productivity) are presented. The first striking result is the negative statistically significant coefficients of the ownership dummy under both techniques. However, one should also consider estimated coefficient of *Y* and *PRIV**CONC variables when determining overall impact of privatization on labor productivity. As we can see, number of years since privatization positively influences labor productivity. This result suggests that immediately after privatization labor productivity drops, but then recovers gradually. Adaptation period for privatized enterprises can take some years before they come up with SOEs' labor productivity. These results are quite comparable with findings of others researchers in Ukraine (Yacoub et. al, 2001). We should also take into consideration the influence of the product of *PRIV*CONC* variables. Ownership concentration in private hands has positive impact on labor productivity. Therefore, we may conclude that if the state stake is sold to few or even one private buyer, overall impact of privatization would definitely have positive influence on labor productivity.

Table 3. Estimation Results. Dependent variable is labor productivity (*PERF*).

Variable	Coefficients (standard errors)			
	GLS		IV	
C	**-7.6289***	(0.253227)	**-3.20954***	(0.634435)
WAGE	**10.68309***	(0.102288)	**10.40905***	(0.112115)
DEBT	**13.20849***	(0.389184)	**13.6773***	(0.386784)
PRIV	**-2.92106***	(0.121429)	**-8.24627***	(0.766751)
PRIV*CONC	**7.019823***	(0.176231)	**5.080848***	(0.303506)
TA	**-34.0296***	(1.754821)	**-33.6995***	(1.885654)
COMPD	**4.183724***	(0.103042)	**4.035902***	(0.10786)
COMPF	**-0.38738***	(0.133279)	-0.04154	(0.136594)
CONST	**-14.3668***	(0.182767)	**-13.2621***	(0.203975)
TRADE	**9.525034***	(0.166925)	**9.637309***	(0.169699)
SERV	**5.601139***	(0.303464)	**6.354998***	(0.363653)

TRAN	**-9.69339***	(0.10238)	**-9.38079***	(0.103683)
AGR	**2.464173***	(0.31054)	**2.798882***	(0.222402)
Y	**0.950747***	(0.036623)	**0.885756***	(0.038295)
Y97	**1.444354***	(0.099319)	**1.111031***	(0.105016)
Y98	**2.447743***	(0.072554)	**2.3279***	(0.077254)
R-squared	0.879933		0.852092	

Significant coefficients are boldfaced.
* - significant at 1%
** - significant at 5%
*** - significant at 10%

Another fact worth mentioning is the significance and comparatively large magnitude of the coefficient of TA (proxy for softness of budget constraints) both in GLS and in IV estimation. One can make a conclusion about superiority of softness of budget constraints over ownership structure and competition effects in their influence on the productivity of an enterprise. However, such a result could be caused by imperfect measurement (subsidies from the government, wage arrears, etc. were not considered), or endogeneity problem — poorly performing enterprises can be allowed for deferral of tax payments, and enterprises with tax arrears perform worse than those with harder budget constraints. Nevertheless, the primary goal of this paper is to figure out effects of privatization, and therefore, we will not stress quantitative relationship between soft budget constraints and enterprise performance.

Domestic competition turns out to be positively correlated with productivity, as it was expected. However, competition from abroad reveals negative impact under GLS estimation method. Under IV approach coefficient near the dummy of foreign competition is not even statistically significant.

Enterprises of trade sector have exhibited most considerable labor productivity growth, and this fact is not surprising. Enterprises of this

group have adjusted for market conditions faster than enterprises of manufacturing sector. Firms providing services follow next. This branch is also highly consumer oriented, and can adjust quickly for changing environment. Surprisingly, that construction sector in comparison with manufacturing exhibits the lower labor productivity. This may be caused by the fact that construction enterprises present in the sample are, as a rule, state-owned.

Both year dummies' coefficients have positive signs in comparison to base year 1999. This trend can be easily explained by the financial crisis, which took place in the end of 1998. Its aftermath is mirrored in the performance of enterprises in 1999.

Reviewing the estimation results of profitability equation yields similar findings. These results are presented in the Table 4. However, in this case ownership dummy variable coefficient has positive sign indicating that privatization improves profitability of enterprises, and its effect is strengthening over time. Ownership concentration in private hands has also positive impact on profitability (as it was expected).

The coefficient of the TA variable is again comparatively large, which can be explained by the similar reasons as in the previous case. Both competition dummies negatively influence profitability of enterprises. This confirms our prediction about negative correlation between the level of competition in the industry and profitability of enterprises operating in it.

We cannot say anything definitely about sectoral differences, as long as two of five sector dummies have statistically insignificant coefficients. Both year dummies (*Y97, Y98*) have positive coefficients indicating the same pattern of performance as in the previous case.

Table 4. Estimation Results. Dependent variable is profitability (*PROFIT*).

Variable	Coefficients (standard errors)			
	GLS		IV	
C	**-0.63562***	(0.069103)	**-0.07269***	(0.01479)
WAGE	**0.049771***	(0.002701)	**0.03501***	(0.002318)
DEBT	**-0.42221***	(0.0245)	**-0.39216***	(0.024639)
PRIV	**0.748036***	(0.084717)	**0.104944***	(0.00868)
PRIV*CONC	**0.15342***	(0.020822)	**0.14578***	(0.028688)
TA	**-1.1963***	(0.40863)	**-0.95815****	(0.457869)
COMPD	**-0.083132***	(0.010446)	**-0.097315***	(0.008773)
COMPF	**-0.0514***	(0.008218)	-0.00755	(0.009182)
TRADE	**0.065258***	(0.013845)	**0.071603***	(0.011348)
CONST	**0.070999***	(0.012489)	**0.04758***	(0.01336)
SERV	**0.193995***	(0.031525)	**0.147131***	(0.033057)
TRAN	0.021028	(0.019818)	0.017125	(0.016735)
AGR	0.099059	(0.063169)	0.059548	(0.06459)
Y	**0.021007***	(0.002686)	**0.004572****	(0.002604)
Y97	**0.07073***	(0.008898)	**0.044113***	(0.008691)
Y98	**0.068551***	(0.007481)	**0.062352***	(0.007445)
R-squared	0.513267		0.581633	

Significant coefficients are boldfaced.
* - significant at 1%
** - significant at 5%
*** - significant at 10%

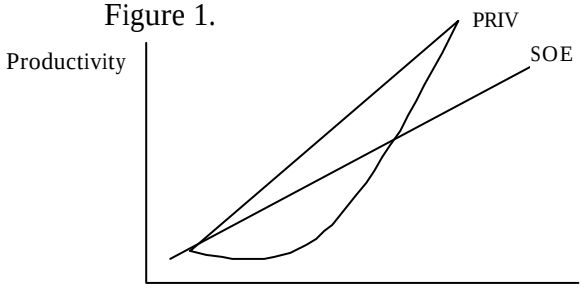
Chapter 5

CONCLUSIONS

In conclusion, we may say that the effects of privatization in Ukraine on enterprise's performance are positive, but they tend to vary when measured by different performance indicators. While privatization has strong positive influence on enterprises' profitability, its effects on labor productivity are not immediate: they become evident only over time. The environment in which an enterprise operates also has significant influence on the firms' performance. Soft budget constraints have particularly strong negative effects on productivity and profitability. Higher level of competition coming from both domestic and foreign rivals is associated with increasing labor productivity, while its impact on profitability is negative. Actually, we rejected both our null hypotheses — coefficients, which are suggested to measure impact of privatization, are statistically significantly different from zero.

Gradual effects of privatization on labor productivity can be depicted graphically, as in the Figure 1. SOE curve represents steady growth of productivity of public enterprises over time. PRIV curve has rather different form. Immediately after privatization, at time t_0, productivity declines, then gradually recovers, and finally begins to grow even faster than SOE's productivity. Adjustment can take some years.

Figure 1.



Such state of matters can be explained by the theory of disorganization developed by Blanchard and Kremer (1997). Authors argue that after collapse of the central planning system enterprise may fall out of productive vertical chain. It may lose connections with its suppliers and consumers. Due to distortion both from supply and demand side output may fall. Similar consequences may happen after the enterprise is privatized. While employment level is not changed much after privatization due to insiders dominated ownership, output may fall making labor productivity to decrease also. Besides, immediately after privatization managers of the firm may have little incentive and ability to monitor the market properly. They might just miss unexploited profit opportunities on the market. But over time enterprise will adjust slowly to new environment conditions, like import competition, from which public firms are often shielded or hardening of budget constraints. The speedier the adjustment process, the faster an enterprise's performance would be improved. Conditions of transitional countries only strengthen these findings. In the context of the Ukrainian environment, where after the break-down of the USSR, industries still were highly integrated and dependent on their suppliers, this theory is quite applicable.

General results of the paper suggest that privatization in Ukraine has more positive features than negative ones. At the same time, simultaneous liberalization of the markets, i.e. removing barriers to entry, exposing enterprises to competition, and especially to competition from abroad will likely produce enterprises that are even more efficient.

Policy Implications

Generally speaking, Ukrainian government should proceed with reforms in the sphere of ownership transformation in the economy. But some policy recommendations could be given based on the results of our study. First of all, maximization of budget revenues should not be the first objective of privatization. The most important goal of privatization is improving enterprise efficiency. In order to achieve this goal, enterprises should be sold to efficient owners. This leads us to the next important recommendation: methods of privatization should be competitive and transparent. Competitive methods yielding the most efficient ownership structure, like commercial tender, auction, open sale of shares should be employed widely. Some progressive changes in the pace of privatization are already outlined in normative acts. In the State Privatization Program for 2000-2002[15] transparency is declared as one of the objectives of privatization. According to the Presidential Decree "On Expedient Measures to Accelerate Privatization in Ukraine"[16], controlling block of shares should be sold to a single buyer — 'industrial investor', entity which has experience in the relevant area of activity and has long-term planning horizon. Concentration of ownership in private hands has positive impact on enterprise performance, as shown in our research.

Results of this study give only general outlines for reformers privatization agenda. In order to make final conclusions about the pace of privatization and its influence on enterprise performance, more elaborate research should be conducted.

[15] State Privatization Program. No. 1723-14, May, 18, 2000.

[16] Decree of the President No. 1626 "On Expedient Measures to Accelerate Privatization in Ukraine", 29 December 1999

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APPENDIX A.

Table A1. Decomposition of the sample by sectors and ownership type

Industries ownership type	**SOE**			**PARTIALLY PRIVATIZED**			**FULLY PRIVATIZED**			**Total number of firms**
	1997	**1998**	**1999**	**1997**	**1998**	**1999**	**1997**	**1998**	**1999**	
Agriculture	7	7	3	7	7	12	12	12	11	26
Cable	0	0	0	1	1	1	0	0	0	1
Chemical	5	5	3	0	0	0	7	7	9	12
Construction	12	12	4	2	2	4	23	23	29	37
Construction materials	5	3	2	1	3	1	15	15	18	21
Electricity	8	8	6	2	2	5	3	3	2	13
Food	19	14	4	18	20	22	49	52	60	86
Glass and ceramics	0	0	0	1	1	0	0	0	1	1
Juwellery	0	0	0	0	0	0	1	1	1	1
Light industry	0	0	1	1	1	1	4	4	3	5
Machinery	7	7	6	12	12	9	27	27	31	46
Metallurgy	3	3	1	1	1	2	4	4	5	8
Mining	1	1	1	1	1	1	1	1	1	3
Oil and gas	7	7	5	9	9	9	6	6	8	22
Pharmaceutics	0	0	0	0	0	0	3	3	3	3
Procurement	4	4	0	4	4	5	16	16	19	24
R&D	1	1	1	0	0	0	5	5	5	6
Telecommunication	1	1	0	0	0	1	0	0	0	1
Tire repair	0	0	0	0	0	0	1	1	1	1
Tobacco	0	0	0	1	1	1	0	0	0	1
Tourism	2	2	2	2	2	2	1	1	1	5
Trade	5	5	2	10	10	14	15	15	14	30
Transport	6	5	2	9	9	12	8	9	9	23
Utility	0	0	0	0	0	1	2	2	1	2
Wood	1	1	0	0	0	0	0	0	1	1
Total	94	86	43	82	86	103	203	207	233	379

Source: Own calculations on the basis of the data available at the SSMSC's websites.

Table A2. Descriptive statistics of some variables

	Mean	Median	Maximum	Minimum	Standard Deviation
PERF	28.3242	17.0624	1219.04	0.00338	62.3705
PROFIT	0.14594	0.04419	81.7531	-7.7032	3.1813
WAGE	2.27271	2.00079	16.9541	0	1.40655
DEBT	0.28942	0.21431	1.59734	0.00123	0.24637
PRIV	0.80162	1	1	0	0.39896
CONC	0.19804	0.10734	1.00398	0	0.24743
TA	0.00205	0	0.20215	0	0.01188
Y	1.60866	1	6	0	1.46689
COMPD	0.80072	1	1	0	0.39964
COMPF	0.23895	0	1	0	0.42664

APPENDIX B

Table B1. Probit Estimation Results.

Dependent variable is ownership dummy ($PRIV$).

Variables	Coefficients	Standard Errors
Intercept	**0.828036***	(0.120174)
Instrument 1	0.035138	(0.176465)
Instrument 2	**-0.24771****	(0.112905)
Instrument 3	0.021964	(0.098892)
Instrument 4	-0.35584	(0.256211)
Instrument 5	0.01141	(0.132437)
Instrument 6	**-0.20354****	(0.105864)
Instrument 7	0.08891	(0.15386)
Instrument 8	**0.442832****	(0.247074)

Significant coefficients are boldfaced.
* - significant at 1%
** - significant at 5%
*** - significant at 10%

Dependent Variable: $PPIV$ (ownership dummy, equal to one if more than 50% of shares are privatized, zero otherwise)

Instrument 1:

$$\text{Current Ratio} = \frac{\text{Inventories} + \text{Other Current Assets} - \text{Pre - paid Expenses}}{\text{Current Liabilities}}$$

Instrument 2 :

$$\text{Acid test} = \frac{\text{Current Assets(Exclusive of Inventories)}}{\text{Current Liabilities}}$$

Instrument 3 :

$$\text{Quick Liquidity Ratio} = \frac{\text{Marketable Securities} + \text{Cash}}{\text{Current Liabilities}}$$

Instrument 4 : Net Working Capital =

Inventories +Other Current Assets – Pre-paid Expenses – Current Liabilities

Instrument 5: Leverage (Net Worth to Assets) =

$$\frac{\text{Capital Net of Future Income and Reserves}}{\text{Total Assets}}$$

Instrument 6 : Leverage (Debt to Equity) =

$$\frac{\text{Non} - \text{current Laibilities} + \text{Current Liabilities} + \text{Future Expense Reserves} + \text{Future Income}}{\text{Capital Net of Future Income and Reserves}}$$

Instrument 7 : Net Working Capital to Gross Working Capital =

$$\frac{\text{Inventories} + \text{Other Current Assets} - \text{Pre - paid Expenses} - \text{Current Liabilities}}{\text{Inventories} + \text{Other Current Assets} - \text{Pre - paid Expenses}}$$

Instrument 8: Working Capital Surplus Covered by Own Resources =

$$\frac{\text{Inventories} + \text{Other Current Assets} - \text{Pre - paid Expenses} - \text{Current Liabilities}}{\text{Capital Net of Future Income and Reserves}}$$

APPENDIX C

Table C1. Over-identifying restriction test (dependent variable is the error terms from the labor productivity equation).

Variable	Coefficient	Standard Errors
INSTRUMENT 1	5.57001	(6.044889)
INSTRUMENT 2	4.673512	(2.225208)
INSTRUMENT 3	1.072341	(1.832185)
INSTRUMENT 4	-4.39596	(4.600493)
INSTRUMENT 5	-2.65315	(2.035692)
INSTRUMENT 6	0.033887	(1.609186)
INSTRUMENT 7	-3.12833	(4.962203)
INSTRUMENT 8	5.737771	(4.499411)
R-squared	0.002524	

Significant coefficients are boldfaced.
* - significant at 1%
** - significant at 5%
*** - significant at 10%

$c_8^2 = n * R^2 = 1122 * 0.002524 = 2.83$ is significant at 10% level, which indicates that instruments are marginally adequate.

Table C2. Over-identifying restriction test (dependent variable is residuals from the profitability equation).

Variable	Coefficient	Standard Errors
INSTRUMENT 1	**0.366692*****	(0.267318)
INSTRUMENT 2	-0.19577	(0.144592)
INSTRUMENT 3	0.233176	(0.256364)
INSTRUMENT 4	0.120376	(0.311432)
INSTRUMENT 5	-0.0633	(0.100459)
INSTRUMENT 6	-0.22175	(0.240702)
INSTRUMENT 7	**0.317935*****	(0.185856)
INSTRUMENT 8	**-0.65277***	(0.287266)
R-squared	0.002531	

Significant coefficients are boldfaced.
* - significant at 1%
** - significant at 5%
*** - significant at 10%

$c_8^2 = n * R^2 = 1106 * 0.002531 = 2.799$ is significant at 10% level, which indicates that instruments are marginally adequate.