Privatization and Stock Market Creation: Evidence from Transition Economies

Zuzana Fungáčová

Dissertation

Prague, June 2009

Zuzana Fungáčová

Privatization and Stock Market Creation: Evidence from Transition Economies

Dissertation

Prague, June 2009

Dissertation committee

Jan Hanousek (CERGE-EI, Prague)

Randall Filer (Hunter College, CUNY)

Evžen Kočenda (CERGE-EI, Prague)

Jan Švejnar (University of Michigan)

Referees

Jarko Fidrmuc (Ludwig-Maximilians Universität, München)

Iftekhar Hasan (Lally School of Management & Technology, New York)

Acknowledgements

Table of Contents

List of Figures

List of Tables

INTRODUCTION

The importance of finance for growth has already been confirmed in numerous studies. This relationship is especially crucial for the transition economies where financial systems had to be built from the scratch after the collapse of central planning. This work investigates stock markets that constitute an important part of the developed financial system. Functioning stock markets are found to be necessary even if the country's financial system is bank-based. In fact, in the transition countries stock markets are a relatively new phenomenon. Even though in comparison to the developed countries these markets remain still underdeveloped, they have been evolving as an important complement to the banks in the course of the transition process (EBRD Transition Report 2006). Stock markets emerged to help with the transformation of the state-owned assets to private hands and afterwards also with the rearrangement of ownership structures. They were also expected to assist companies in raising capital; however, the low number of initial public offerings in transition countries confirms that they have not succeeded in doing so. In addition to these functions connected to the transition process, stock markets in emerging countries are necessary in terms of performing the standard roles of financial market that include providing information about possible investment and improvement of resource allocation, monitoring investments and exerting corporate governance, risk diversification and mobilization of savings (Levine, 2005).

Even before the stock markets were established, privatization process was initiated in transition countries. Its main goal was ownership transformation that would create suitable conditions for restructuring and development of the economy. As it is discussed at the beginning of the first chapter, privatization methods differed by countries. Some of them did not have any connection to the stock market, some only indirect one. Mass privatization, however, was pushed forward by stressing that in addition to equal distribution of wealth, it would also contribute to establishing a functioning stock market. Since mass privatization was in different forms implemented in the majority of transition countries, it stands out as an important factor influencing stock market emergence and development. The literature that investigates determinants of stock market development in general considers various institutional and macroeconomic

factors, the role of privatization in this process has however not been sufficiently discussed so far.

The first chapter of this dissertation investigates the relationship between mass privatization and stock market development in transition economies. The link is investigated empirically using a panel of data that includes transition countries for which corresponding data is available. The results confirm the hypothesis that mass privatization exerted a negative influence on stock market functioning in the short and medium term. Further, it appears that stock markets in countries with mass privatization were initially perceived as mere byproducts of the privatization process. Such stock markets typically not only failed in their core mission of providing capital for the corporate sector, but generated negative investor sentiment and did little to catalyze economic growth.

The second chapter studies stock market emergence and development in the Czech Republic, one of the first countries where mass privatization was implemented. This economy later also served as a model for other transition countries. Czech privatization can be regarded as an experiment which allows us to conclude under what circumstances a viable market for shares could arise. Unlike the first chapter, where aggregate country data is used, in this study we employ micro level data on firms that participated in the mass privatization. We estimate the determinants of shares delisting e.g. exclusion from public trading on the Prague Stock Exchange (PSE) during the period 1993 – 2004. Unlike its counterparts in Poland or Hungary, exceptionally large amounts of shares were delisted from the PSE. Using the data on listed and delisted companies it is showed that it was possible to prevent massive delisting if certain pre-privatization and privatization characteristics of the companies had been taken into account when deciding which companies to place on the stock exchange for public trading following the mass privatization.

The third chapter deals with the analysis of delisting in the Slovak Republic, where in comparison to the Czech Republic, delisting took place five years later. We utilize a special relationship between the Czech and Slovak economy to investigate the role of delisting in the process of stock market emergence. A close connection between the Czech and Slovak market and a very similar unfavorable development on both

markets in the second half of 1990s, despite different institutional changes, emphasize the importance of mass privatization implemented in these countries. Benefiting from the results of our investigation in chapter two, we compare the development in Czech and Slovak economies and analyze the role of delisting in the process of market emergence and also reasons for delisting in both countries. Different delisting strategies and subsequent development on these markets suggest that decisions of the stock exchange authorities are crucial for further functioning of the market.

CHAPTER 1

BUILDING A CASTLE ON SAND: THE EFFECTS OF MASS PRIVATIZATION ON STOCK MARKET CREATION IN TRANSITION ECONOMIES[1]

1.1 Introduction

Privatization, which enabled the transfer of state-owned enterprises to private hands, has been considered one of the keystones of the transition process in all post-communist economies and it became one of the first objectives of the newly formed governments. The emphasis was put on fast transfer of ownership via privatization and market was believed to ensure better and more efficient performance of the economy (Roland, 2001). In fact, efficiency was the most important argument for privatization as the transfer of ownership rights is crucial for the efficient allocation of resources in the economy. This way, the argument went, economic growth should be initiated. However, to achieve these objectives privatization itself is not sufficient since the functioning of a market economy requires not only private ownership but also a certain institutional framework to support the whole system. Roland (2001) in this respect stresses that the "policies of liberalization, stabilization and privatization that are not grounded in adequate institutions may not deliver successful outcomes" (p.30). More specifically, Zinnes et al. (2001) argue that "privatization involving change-of-title alone is not enough to generate economic performance improvements" (p.147). Therefore, what they call "deep" privatization, including institutional and "agency"-related reforms, is necessary.

Unfortunately, taking into account the experience of the majority of transition countries, privatization can hardly be considered "deep". The first reason is the fact that the state tends to use certain instruments (e.g. golden shares) to maintain control over some enterprises. Thus there exists a contradiction in the way the state behaves, insofar as

---

[1] For valuable comments I am indebted to Randall Filer, Jan Hanousek, Jan Kmenta, Evžen Kočenda, Filip Palda and Jan Švejnar. The paper benefited from various presentations at CERGE-EI as well as VIIIth International Conference Countries in Transition in Sofia (2005).

it initiates and supports the privatization process while at the same time exercising certain power over some companies[2]. This kind of discrepancy significantly slows down the transition process and may result in incomplete privatization. Secondly, the necessity for an institutional and legal framework was in many countries recognized only after the privatization process itself had begun, which led to the creation of some institutions within a very short period of time[3]. Given these problems, privatization as actually conducted cannot be considered "deep" privatization in the sense defined above. An important implication is the understanding that deep privatization not only enables private ownership but at the same time influences the development of institutions (incurring "hidden" costs) and through this channel the functioning of the whole economy.

Privatization also profoundly affects the financial sector. Financial systems, which have no real function in the planned economy, must be developed from scratch during the transition process. As Bonin and Wachtel (2002) note, financial sectors in all transition countries continue to be relatively underdeveloped compared to the overall level of development of their economies. The capital needed for restructuring of transition economies (World Bank, 1996) has been far greater than initially weak, undercapitalized domestic banks could provide. The possibilities of firms to finance their investment activities was further limited by the inability of most to generate sufficient profits to finance the restructuring through retained earnings, a situation that suggests a great deal of reliance on equity financing. Thus, functioning stock markets became a necessity for firms in transition economies seeking capital. Development and regulation of these markets belong among the key issues that indicate the progress of reforms[4].

Besides their traditional role in raising capital, stock markets in transition economies have assisted in the transformation of state ownership and the rearrangement of ownership structures. Despite the importance of stock markets in these economies, the

---

[2] See Kočenda (1999); Kočenda and Valachy (2002) for calculations and more details.

[3] This problem was also pointed out by the World Bank Operations Evaluation Department (2004) when evaluating Economies in Transition. The OED claims that one of the two reasons why "the initial emphasis on rapid privatization to promote private sector development did not always achieve its intended effect was the lack of a supporting legal and institutional framework" (p.1).

[4] Development and regulation of stock markets are now tracked as key indicators of progress in reform. The EBRD has constructed indicators reflecting progress of the financial system reform in transition countries. For more details see EBRD Transition Reports 1995–2003.

connection between privatization and stock market development has received little attention. In a study on the impact of the privatization process on the development of local stock markets, Perotti and Oijen (2001) argue that the resolution of political risk through sustained privatization is an important source of growth in the emerging stock markets. They show this on a sample of emerging markets where privatization using stock markets took place in the 1980s. Stock markets in these countries were working before the actual privatization and the privatization method was dependent on the functioning stock market. This connection between privatization and stock markets, unfortunately, cannot be directly applied to the transition economies where privatization methods varied widely across countries and stock markets were not in place before privatization measures were introduced. The focus of this strand of research in transition countries has so far been on the positive effect of privatization on growth[5], while the relation between privatization methods and newly established stock markets has received little discussion.

Due to the large variety of privatization methods implemented (Brada, 1996), their relation to emerging stock markets also varies considerably. It is thus essential to consider advantages and disadvantages of different methods ex ante, i.e. from the perspective of decision-makers at the beginning of transition.

While privatizing state assets through the stock market contributes positively to its functioning, direct sales of state assets in fact do not affect stock markets, at least not at the time of sale[6]. On the other hand, by the administrative decision of putting shares of all privatized companies on the market, mass privatization programs tended to ignore the standard listing requirements and suppressed the traditional concept of stock market development. It was incorrectly assumed that more publicly traded companies would generate a more liquid market. Such an artificial approach led to problems with stock market development, and the affected markets fell behind those, which had evolved gradually, in a more standard way. Hence, the functioning of stock markets in mass privatization countries would seem to lag the development of other transition economies,

---

[5] For more details see e.g. Bennett et al. (2004).
[6] Later on, when the privatized companies grow, they can use stock market as one of the sources of capital (through IPOs) and this way fuel their operations.

which we consider to be the price for establishing stock markets only as a kind of "by-product" of mass privatization.

The primary objective of this research, therefore, is to empirically investigate the connection between the privatization method implemented and the consequent capital market development. Considering the entire transition process with an emphasis on the country's institutional setting and legal framework reveal the costs implied by mass privatization with respect to stock market creation. Our aim is both to describe the situation in transition countries and by utilizing the available data determine the influence of privatization method on the emerging stock market.

Our results provide empirical evidence confirming that mass privatization influenced stock market development and exerted a negative impact on stock market functioning in transition countries. We confirm this relationship using different indicators of stock market development in the short and medium run.

The following section provides motivation for our work. Section 1.3 discusses the privatization process in transition countries, section 1.4 provides an overview of stock market development in these countries and section 1.5 examines mass privatization in connection to stock market emergence and development. In sections 1.6 and 1.7 we discuss the data used, specifications of estimated equations, results and their interpretation. Section 1.8 concludes.

1.2 Importance of a functioning stock market

Investigation of the relationship between privatization method and stock market emergence is important not only in the context of the economics of transition but also for the long-term development prospects of these countries[7]. Stock markets in general provide an important source of financing viable investment projects and thus indirectly initiate further economic growth. Empirical studies of King and Levine (1993), Levine and Zervos (1998), Rousseau and Wachtel (2000), Beck and Levine (2004) provide evidence of a positive correlation between stock market development and economic

---

[7] The importance of economic growth for transition economies and the problems connected to it are discussed in e.g. Campos and Coricelli (2002).

growth. Levine and Zervos (1998) use data on 47 countries (1976 – 1993) to show that stock market liquidity and banking development are positively correlated with contemporaneous and future rates of economic growth, capital accumulation, and productivity growth. Rousseau and Wachtel (2000), by employing panel techniques, find that deep and liquid equity markets have had a significant and persistent impact on economic performance. They indicate that stock markets promote economic development by providing investors with a potential exit mechanism, offering liquidity to investors that encourages diversification, supplying firms with access to permanent capital and generating information about the quality of potential investments. Beck and Levine (2004) apply generalized-method-of-moments techniques developed for dynamic panels. They show that stock markets and banks positively influence economic growth and that these findings are not due to potential biases induced by simultaneity, omitted variables or unobserved country-specific effects. Positive influence of stock markets on growth holds true even for bank-driven financial systems prevailing in transition countries. As Korhonen et al. (2000) argue, stock markets in both market-based as well as bank-driven systems provide economic agents with valuable information about prices in the economy and offer a means of reallocating risks. Therefore, their importance within the financial system should not be neglected by policy makers in transition countries.

In the context of stock market development another important stream of empirical literature examines the institutional framework, including the legal system, as a major determinant of financial development (La Porta et al. 1997, 1998, 2000; Demirguc-Kunt and Maksimovic, 1998). These studies emphasize the importance of the rights of minority shareholders as well as creditors. Better legal systems in this respect ensure a safer environment for investors, meaning that the financial sector can develop much faster. However, good legal systems are necessary but not sufficient, because as Pistor et al. (2000) stress, a persistent obstacle towards greater financial development is the lack of enforcement of existing laws.

An important role that well-developed securities markets play concerns the possibility to prevent crisis in the banking system if a credit crunch occurs. In such a case securities markets can help fill the ensuing funding gap and thus the "existence of

multiple avenues of financial intermediation" can be important in preventing financial crises from causing sustained knock-on effects on the real economy (Wagner and Iakova, 2001). In this respect Davis (2001) finds empirical evidence that the existence of active securities markets alongside banks is beneficial for the stability of corporate financing. However, in this case it is also necessary to take into account the other side of the coin, which is the possibility of securities markets contributing to financial crisis, especially if they become too liberalized and vulnerable to global shocks.

All in all, a country's financial development is closely related to its institutional and legal framework and, it is also one of the factors fostering economic growth. This area of research points out crucial role policies play in supporting the development of financial intermediaries and markets. Nevertheless, we need to be careful in applying these considerations to transition countries, since all of the above-indicated standard and well established relationships may not hold as strongly and straightforwardly as in the developed economies. This view is supported by Berglof and Bolton (2003), who examine the experience of financial transition based on the ratio of domestic credit to GDP being a measure of financial development. They argue that the link between financial development and economic growth does not appear to be very strong during the first decade of transition. Nevertheless, the findings of Bennett et al. (2004) which investigates the impact of differences in privatization and in private sector and stock market development on economic growth in transition economies during the time period from 1991 to 2001 confirm a significant positive impact of stock market development on growth.

Although in the context of transition the aforementioned relationships are at present not all that persuasive, the real functioning of stock markets is of vital importance for all transition economies. In the course of the transition process these markets facilitate allocation of property rights either after the initial distribution of vouchers in a mass privatization or in the case of the sale of state assets through direct share offerings (World Bank, 1996). Furthermore, despite strong internationalization pressures and the possibility of listing securities abroad, these markets are expected to serve as a source of capital for the expanding medium-sized companies (Bakker and Gross, 2004) that are

crucial for economic growth. However, Bakker and Gross further emphasize that they do not expect small stock exchanges in transition countries to survive on their own but rather to enter into strategic partnerships with other exchanges[8]. On the other hand, larger companies have an advantage because of the possibility to enter markets abroad, in comparison to smaller enterprises that suffer from various constraints (Lizal and Švejnar, 2001) and therefore have to rely on the functioning local stock markets. The need for efficient stock markets in transition economies is thus essential and should be considered one of the main policy priorities in these countries.

1.3 Privatization process in transition economies

A majority of studies concerning transition countries indicates that the overall impact of privatization on the functioning of these economies was positive (Djankov and Murrell, 2002; Estin et al., 2009)[9]. Yet, even though various impact channels are examined in these studies, care needs to be taken when interpreting their results. As Stiglitz (1999) points out, means and ends are often mixed together here. The main objective of privatization is to attain efficiency in the economy and to initiate sustainable economic growth. Hence privatization serves as a mean to these ends. However, in a broader sense even the creation of a market economy can be a means to sustainable development. If this kind of interpretation is considered, Stiglitz argues that the success of market-oriented reform is more mixed. On the other hand, private property is undoubtedly one of the key inputs in the standard model of a market economy and thus privatization, despite certain doubts and controversies concerning the whole process, is necessary.

The privatization process itself depends on several crucial factors that are of importance for this study as well. In general, the chosen privatization method plays a key role (World Bank, 1996). Even the sequencing of the whole process becomes very important (Gupta, Ham and Švejnar, 2000). In the context of transition countries, at every phase of the privatization process, crucial decisions were taken by the state authorities;

---

[8] This process has already started e.g. Vienna Stock Exchange acquired shares in Budapest as well as Prague Stock Exchanges. All the stock exchanges in Baltic countries are part of the OMX group.
[9] The results showing mostly positive impact of privatization on transition economies have been challenged by Hanousek, Kočenda, and Švejnar (2007).

privatization is therefore considered to be exogenous[10]. The decisions of these authorities differed and thus, as Table A1.1 in the appendix indicates, the privatization process has exhibited a large degree of variability as each transition economy has pursued its individual strategy (World Bank, 2002). The table also illustrates the importance of the voucher method as primary as well as secondary method of privatization. Nevertheless, differences among countries do not concern only the methods implemented. Variability is caused by the different initial conditions, political backgrounds, and other country specific factors, as well as the speed, sequencing, and timing of the privatization in the context of the whole transition process.

The World Bank report assessing the first ten years of transition (2002), stresses that the ideal privatization strategy leading to the best after-privatization performance of companies would have been to transfer assets as rapidly as possible to individual investors or concentrated groups of strategic investors through open, fair and transparent methods. Unfortunately, such a procedure was not possible to implement in many countries given certain country specific characteristics, especially those of a political nature (Biais and Perotti, 2002). In this respect, the argument of equal distribution was very strong especially in the countries where voucher privatization played a significant role. Besides these characteristics, the gains in economic efficiency or necessary government revenues from privatization were crucial (Gupta, Ham and Švejnar, 2000). Accordingly, the designers of privatization mainly considered the speed of the ownership transfer together with economic and political issues important at that time, but did not accurately estimate or even take into account the possible future consequences of employing a certain privatization method.

In general, privatization was one of the first reform steps undertaken in the transition process and different privatization methods tended to affect the development of emerging stock markets in different ways.

• SMALL SCALE PRIVATIZATION concerned small and medium enterprises privatized by implementing particularly simple auctions at the beginning of the transition

---

[10] Exogenous here means the decision about privatization and its timing with respect to the stock market. Clearly, the privatization decision is not a function of the stock market.

process. In this respect, small-scale privatization is considered to be one of what the EBRD transition report (2003) considers initial phase reforms, which are more straightforward and relatively easier to implement[11]. And true enough, this level of privatization has been for the most part successful, and the majority of transition countries have managed to conclude it relatively quickly. Yet from our point of view it is important to note that the small-scale privatization neither initiated nor had an effect on the stock market development, since most of these firms were and stayed not large enough to become publicly traded.

- THE SALE OF STATE PROPERTY (case-by-case privatization) concerns primarily large and strategic enterprises, and has not yet been completed. Case-by-case privatization can take the form of direct sales or share issue privatization, similar to initial public offerings in the private sector (Brada, 1996). State property is sold directly to the new owner, who can be domestic as well as foreign. According to EBRD (2003), this privatization method belongs to the category of so-called second phase reforms, which are more complex and take longer to implement as they require the development of market-based structures and institutions, including a stock market. In this respect, case-by-case privatization influenced stock market greatly. However, in this case stock markets tend to emerge gradually and originate through voluntary IPOs, which themselves are either initiated by share issue privatization or by firms already acquired by new owners who are searching for additional capital resources, since the supply of capital for restructuring from other sources is limited[12]. Conditions in the economy thus require the existence of a stock market, and allow it to develop in a standard way.

- MASS PRIVATIZATION was considered an appropriate privatization method especially with respect to the conditions that prevailed in transition countries at the beginning of the transition process[13]. Further, its social and political acceptability

---

[11] The World Bank (1996) also stresses that small assets are easier to privatize than larger enterprises and that positive outcome in the former category are relatively assured.

[12] In this respect the role of banks in the economy is important. Whereas in the Czech Republic companies were able to obtain loans from a bank relatively easily (soft budget constraint), in Hungary it was quite difficult to obtain resources from a bank and therefore the stock market development was initiated from the inside.

[13] This basically concerns undercapitalization and the lack of foreign investors' interest to invest in these economies. This issue has already been discussed in the introduction.

followed from the equal distribution of shares as well as from the fact that citizens incorrectly perceived income from privatization to be net profit for them. The Barro-Ricardian equivalence was hence not valid, which gave the authorities a chance to "bribe" people and gain their support for mass privatization (Hanousek and Tůma, 2002).

All in all mass privatization was, in different forms and modifications, included as a part of the privatization program in 21 out of 27 transition economies. Still, the proportion of formerly state owned assets privatized using this method differed considerably among them. Table A1.2 in the appendix illustrates the different variations of mass privatization that were implemented[14]. The first countries to implement mass privatization already at the beginning of the 1990s were Russia and the former Czechoslovakia. They later served as a model for other countries (e.g. Bulgaria's first wave of mass privatization followed the Czech model: for more details see Table A1.3 in the appendix). The relatively high number of mass privatization models that are presented in the table also suggests that the diversity of ways in which privatization was implemented has also had a further impact on the outcomes of the whole transition process. Nevertheless, the way voucher privatization was conducted led to only a formal change of ownership from the state to a large number of uninformed shareholders who had no experience managing these kinds of assets. In essence, this means that the ineffectiveness connected to the state as an owner was in fact just transferred to a group of new owners who could be considered "quasi-owners," and who did not think strategically and whose planning horizon was relatively short. As the World Bank (1996) report points out, these owners were survival-oriented, focused only on sustaining current cash flow. Since the immediate liquidation value of such companies was often higher than the net present value of future investments (Lízal and Švejnar, 2001) it was more profitable for these "quasi-owners" to "tunnel" the company and use its assets to make themselves better off.

Given the way it was conducted, then, mass privatization cannot be considered "deep" privatization in the sense defined above. It brought about serious problems that

---

[14] Some countries provided equal access to all citizens while in others there were significant concessions provided to insiders: Russia, Moldova, Georgia, Armenia (for more details see EBRD Transition Report 1997). This fact has also influenced trading with shares after the privatization.

were either dismissed as only temporary (and were believed capable of being solved by the power of the market[15]) or that were not accounted for when privatization was undertaken. Mass privatization failed to generate the new capital necessary to restructure companies strategically, or to concentrate ownership. Its implementation is thus still subject to debate. Nevertheless, it is important to note that mass privatization would not necessarily have been unwise or inappropriate, if its natural continuation had been recognized and implemented. The World Bank report assessing the first ten years of transition (2002), for instance, points out that mass voucher privatization in the former Czechoslovakia would have had a better chance of producing more restructuring and less corruption if the legal framework governing companies, investment funds, and capital market activities had been enforced from the very beginning. The fact that other transition countries where mass privatization was a dominant privatization method suffered from similar weaknesses in the way this procedure was implemented would indicate that the success of mass privatization required a transparent and appropriately regulated stock market with minority shareholders' protection and active corporate governance (Hanousek and Kočenda, 2003). If these conditions had been set up properly in the immediate aftermath of mass privatization, the results of the overall privatization process would have been far more satisfactory. The failure to set up these conditions and even more to the point the failure to recognize the impact of privatization on the stock market, naturally precluded a more satisfactory outcome to the privatization process.

1.4 Stock markets in transition economies

Before investigating the role of privatization in stock market development, we first briefly examine the phenomenon of stock market emergence in transition economies. This issue is of particular importance because stock markets are, even today, not yet properly functioning and in comparison to their western counterparts relatively unimportant for the

---

[15] Mutual privatization funds were expected to contribute to active corporate governance after the shares of formerly state enterprises were distributed in mass privatization.

domestic economies in the great majority of countries[16]. Therefore, it is useful for policy makers to know which forces make stock market operate.

1.4.1 Factors determining the emergence of stock markets

Whether a stock market in a certain country exists is determined by a large variety of factors, many of them having a connection to economic growth; in the context of transition economies privatization, macroeconomic stabilization, and the regulatory environment are of particular importance (EBRD 1998).

Initial conditions prevailing at the beginning of the transition process concern a lot of aspects and therefore it is difficult to measure them succinctly. They affect the economic performance in transition countries (De Melo et al., 1997; Berg et al., 1999; Fischer and Sahay, 2000; Falcetti et al., 2001) and can to certain extent influence stock market emergence as well. The process of stock market creation is relatively easier for countries that already have a certain tradition and experience with its functioning: that is, it had existed in that country before communism[17].

Nevertheless, as has already been discussed earlier, the privatization process plays a role in this process. Based on the EBRD Transition Report 1995 the development of the securities markets in transition countries "has so far been largely shaped by the nature of privatization programs" (p.164). Not only do certain privatization methods require the immediate existence of a stock market but they also determine the post-privatization ownership structure. Based on this structure further trading evolves, and in this way privatization method becomes a mechanism that predetermines the functioning of an emerging stock market (Czech Republic: Capital Market Review, 1999).

Related studies concerning stock market development (King and Levine, 1993; La Porta et al., 1997; Henry, 2000; Yartey, 2008) provide evidence that the most crucial factors influencing stock markets include the macroeconomic environment and institutional arrangements in the economy. With increasing income per capita individuals

---

[16] For more details see Wagner and Iakova (2001), Bonin and Wachtel (2002), Köke and Schröder (2002), EBRD Transition Report 2003 as well as law-oriented literature e.g. Ahdieh (2003).
[17] EBRD Transition Report 1995 also notes that the formation of securities markets began in 1990-91 with the reestablishment of exchanges in Bulgaria, Croatia, Hungary, Poland and Slovenia. Then in 1993 the Prague Stock Exchange was reopened.

tend to have more resources available to invest on the stock market and this contributes to its development. As Garcia and Giorgio (2003) note, there is a tendency for the share of equity markets to increase relative to banking markets as per capita income increases. Another related variable is the level of public debt in the economy, since the higher level of debt can to a certain extent cause crowding out of the private sector from the stock market. Moreover, the empirical evidence shows that inflation negatively influences stock market.

The role of institutions and appropriate legal environment in the transition process has already been pointed out as well. According to Ahdieh (2003), law scholars have identified, at most, an indirect role for law in the market transition process. This role basically concerns creating a framework within which securities markets will spontaneously emerge. It includes clear property rights, provision of reliable contract enforcement and more recently the protection of minority investors. Pistor (2000) argues that these are necessary but not sufficient conditions for healthy stock market development because what seems to matter most in transition economies is the actual enforcement of law.

The development of stock markets may be slowed down if there are other strong financial intermediaries in the economy, namely banks providing enterprises with sufficient credit. Yet empirical evidence (King and Levine, 1993; Levine and Zevros; 1995) shows that the effect of banks and the effect of the stock market do not eliminate each other, and that both do contribute to economic growth. Thus, if both of these financial intermediaries function well, raising capital for investments is more efficient and this naturally stimulates economic growth. Nevertheless, banks may continue to be favoured due to tradition and also because stock markets generally require more sophisticated investors making decisions about their portfolios. In spite of their preferred position, however, banks depend on progress made in the financial system and in banking reform, both of which are inseparable parts of the transition process. And as Table A1.4 in the appendix indicates, financial system reform has not progressed far enough in all the transition economies.

The influence of these factors on developing stock markets has already been discussed in the relevant literature. The exception seems to be the privatization method and its implementation which, we conjecture, has played a key role in stock market formation. This conjecture has not been sufficiently addressed in the literature so far.

1.4.2 Development at the emerging stock markets

Given the above-suggested connection between privatization and stock markets, the success of transition reforms[18] is questionable also with respect to the functioning of stock markets. This is partly the result of insufficient reforms and partly due to the fact that even though certain laws and regulations have been enacted, it takes time to implement and enforce them and to observe any positive results connected to the changes in legislation. Therefore, as EBRD Transition Report 2003 reports, even though improvements in the legal and regulatory framework for pension funds, growing transparency, and efficiency and sophistication of the securities market have been observed (especially in Russia, Serbia and Montenegro and Slovakia), the financial sector in the transition economies is still considered underdeveloped. Despite financial sector's overall growth, nonbank sector has been growing only in recent years (EBRD Transition Report 2006).

As to the development of the financial sector, stock markets have followed different patterns in transition countries. In comparison to other structures of the market economy, their creation is more complicated because there is a need to support the institutional infrastructure and regulatory mechanisms as well (Bonin and Wachtel, 2002). However, this need was not sufficiently taken into account in some countries[19].

Stock market development mainly started from scratch despite the fact that some of these markets were actually reestablished after several decades. Depending on the country stock markets emerged at different stages of the transition process. Some of them

---

[18] It should be noted that the privatization of some strategic enterprises as well as other aspects of the transition process have yet to be completed. EBRD Transition report (2003) notes that even in the most advanced countries of Central Eastern Europe and the Baltics (CEB) that became members of the EU, reforms have to continue. This mainly concerns the breadth and depth of these countries' financial markets and the restructuring of strategic sectors such as energy, heavy industry and agriculture.
[19] A good example in this respect would be the creation of SEC in the Czech Republic only in 1998, five years after trading at the Prague Stock Exchange started.

officially started in the early 1990s. This first group includes countries where mass privatization was not implemented as a primary method: Slovenia (1990), Hungary (1990) and Poland (1991). Then, in 1993 stock exchanges in the Czech Republic, Slovakia and Lithuania followed, all of them connected to the mass privatization program. Other stock exchanges were established later on in the mid-1990s (Romania, Latvia, Estonia, Russia) but there are still several transition countries where stock markets in fact do not exist[20]. Yet another distinct feature in transition stock market development is the impetus for their creation. While in some countries their formation was an inseparable part of the transformation strategy and was, together with the framework for security trading, planned well in advance (this concerns the first group of countries mentioned above), there are other instances where this was not the case and stock markets emerged only because they were necessary to supplement other reforms, most often mass privatization. This has consequences for the way these markets developed. The "planned" ones, despite their volatility, grew gradually with a clear upward sloping trend. The others experienced a kind of overheating during the first years of their existence, then encountered significant problems and in fact had to start over again at the end of the 1990s (see Figure A1.1 in the appendix).

The emerging stock markets of transition countries hence still do not perform their primary economic function and are rarely used as a source of finance for the corporate sector (Wagner and Iakova, 2001). These markets are in general characterized by low liquidity because only a few securities of the most important companies are usually traded frequently enough on each market (Wagner and Iakova, 2001; Bonin and Wachtel, 2002; Bakker and Gross, 2004). Such a situation naturally results in more expensive financing possibilities for companies and thus this source of finance is seldom used.

Yet another indicator describing stock market functioning is market capitalization relative to GDP, which is despite its high levels following mass privatization relatively low[21] in transition economies. As Table A1.5 in the appendix illustrates, even though the two best performing countries (Estonia: 27.5%, Czech Republic: 20.8%) reach the values

---

[20] Here we refer to de facto existence, not de jure. This concerns Albania, Turkmenistan, Tajikistan.
[21] Table A1.7 in the appendix shows that based on our data set its average stands at 9 %.

characteristic for other emerging markets (e.g. Argentina: 27.7%, Brazil: 25.65%, Mexico: 27.12%), they are still significantly falling behind the market capitalization to GDP figures for the developed markets (e.g. United Kingdom: 131.69%, United States: 105.9%, or EMU markets: 44.56%).[22] Moreover, as the ECB report concerning financial sectors of EU accession countries (2002) observes, given the relatively low levels of GDP per capita, market capitalization in absolute terms is particularly low.

The indicators of stock market liquidity give nearly the same picture. When considering the value of stocks traded (as % of GDP), the best performing transition economies (Hungary: 10.7% and Estonia: 10%) are comparable with other emerging markets (Brazil: 11.59% and Mexico: 9.16%), however they are far behind the developed economies (United States: 124.1%, United Kingdom: 70.42%). Turnover ratio indicator values are somewhat better, especially for the best performing transition economies as they are already close to some of the developed markets (EMU: 103.16%, United Kingdom: 64.16%).

Further general characteristics of transition stock markets include insufficient regulation, institutional fragility or weak minority shareholder protection. All of these problems are connected to the legal and institutional framework, which in most cases did not exist when stock markets were established (EBRD 1998; Bonin and Wachtel, 2002) and which is still not sufficiently developed nor functioning well. The problem in this respect is twofold: not only is a certain time needed to make such a framework operational but the simple copying of institutions that are functioning successfully in developed economies is not sufficient to guarantee success. Hanousek and Filer (1997) in this respect stress that lack of experience combined with legal and regulatory uncertainty can result in institutions failing to perform their roles efficiently. On the other hand, especially in those countries accessing the EU, the necessary legislation has already been enacted and thus the legal environment is expected to improve. However, the enforcement of these new rules also requires a certain period of time, and the positive impact of this legislation is still not clearly visible.

---

[22] All figures in this table are averages for individual countries corresponding to available data for the period 1989 – 2003.

Even though stock market development in the transition countries has not been too favorable so far, and even though markets tend to be inefficient, illiquid and unreliable, there are still possibilities to improve the situation, especially thanks to the pension system reforms that have been gradually implemented or are under consideration in most of the transition economies. Institutional investors are expected to play a significant role in the new pension systems and thus contribute to greater liquidity and turnover on the stock exchanges (Wagner and Iakova, 2001). Moreover, pension reform is also supposed to spur the demand for domestic securities: but in this respect the lack of securities in which investors would be willing to invest creates a significant obstacle (most of the emerging markets have only a few such securities). Yet another means of boosting the performance of transition capital markets is the option that most governments in these countries still possess − to privatize residual state ownership in strategic companies through the stock market and to attract potential investors in this way.

Despite all of the above-mentioned problems, trading has become more lively, especially in those countries that have accessed EU and thus are more attractive for foreign investors. Additionally, a trend towards integration among stock exchanges[23] contributes to the simplification of trading and at the same time offers a larger portfolio of products for potential investors.

1.5 Mass privatization and stock market development

Privatization methods in transition countries were rarely driven by the objective of developing a modern stock market (EBRD Transition Report, 1997). Yet despite this fact, stock market development per se in transition countries indicates a possible connection between the privatization method employed and the consequent stock market functioning, something which has not been considered in the recent literature dealing with the emergence and development of stock markets in transition economies. One important study that at least recognizes the importance of institutions and law is that by Claessens et

---

[23] Estonian, Latvian and Lithuanian stock exchanges are already part of the OMX group together with the Stockholm, Helsinki and Copenhagen stock exchanges.

al. (2000)[24]. Examining 20 transition economies, they distinguish three sources of stock market origins: mandatory listing following mass privatization, voluntary initial public offerings (IPOs), and mandatory listing of minority packages (Table 1.1).

Table 1.1: Sources of stock market origins

Mandatory listing after mass privatization	Voluntary initial public offerings	Mandatory listing of minority packages during privatization
Bulgaria	Croatia	Armenia
Czech Republic	Estonia	Azerbaijan
FYR Macedonia	Hungary	Kazakhstan
Lithuania	Latvia	Kyrgyz Republic
Moldova	Poland	Poland
Romania	Slovenia	Russia
Slovakia		Ukraine
		Uzbekistan

Source: Claessens S., Djankov S., Klingebiel D. (2000): "Stock Markets in Transition Economies," Financial Sector Discussion Paper No.5, The World Bank.

The authors further assess the development of stock markets using different indicators and conclude that these markets are underdeveloped in comparison to those in industrial countries, and that the basic financial sector infrastructure is often missing. An empirical analysis based on a regression model highlights the importance of mild inflation, good shareholder protection, and institutional investor assets for the development of stock markets in transition economies. However, the influence of privatization is not taken into account.

If one considers mandatory listing of minority packages a special case of mandatory listing, even the above-mentioned classification can fit the general pattern of two basic approaches through which capital markets can be created: so-called top-down (government-led) and bottom-up (market-led) (Simoneti, 1997). In the top-down approach the government takes the initiative (World Bank, 1996) and the necessary laws and regulations are prepared before the actual trading starts. Development begins at the high end of the market with only a small number of high quality stocks initially traded.

---

[24] It was followed by several papers (Pajuste, 2002; Bonin and Wachtel, 2002; Claessens et al., 2003; Berglof and Bolton, 2003) which strongly relied on its findings and extended them in different directions concerning financial system architecture, corporate governance, or European integration.

These securities are offered in traditional voluntary IPOs on the stock exchange, and trading with them tends to be fairly liquid. Later, when the market develops, the number of stocks traded also grows. This kind of stock market creation dominated in both countries where there was no mandatory listing of securities in the aftermath of privatization (e.g. Hungary) and where stock markets were created well before the actual mass privatization began (Poland). In fact, stock markets without mandatory listing typically develop because economic conditions require it, as the supply of capital for restructuring from other sources is limited[25]. Nonetheless, this approach also has its shortcomings in that there is a risk of overregulation; in this way the market's true needs might not be accounted for, as is the case in Albania (World Bank, 1996) where the stock market de facto has not worked so far.

On the other hand, under the bottom-up approach, supply and demand form the rules that govern the market since there are no, or only minimal, regulations set up before trading on these market commences. More effective rules and institutions tend to develop this way (World Bank, 1996) but the disadvantage is the existence of the unregulated market before the actual rules are set. This situation is typical for economies where stocks were mandatory listed following mass privatization, which was implemented in various modifications (see Tables A1.2 and A1.3 in the appendix). The natural outcome of such a privatization is a large number of stocks that are listed on the stock exchange governed by minimal regulations. Such markets were required to facilitate quick ownership transformation and thus the development of a stock market is nearly spontaneous, being only a response to the trading needs generated by privatization (Fine and Karlova, 1998). Taking this statement to extremes, it is possible to consider stock markets a kind of by-product of mass privatization.

Simoneti (1997) distinguishes two bottom-up scenarios. Under the first one, stocks of all companies are traded on the public market. In order to enable this, minimal regulatory standards are set (Czech Republic, Slovakia). Gradually, as regulation

---

[25] In this respect the role of banks in the economy is important. Whereas in the Czech Republic companies were able to obtain loan from a bank relatively easily (soft budget constraint), in Hungary it was quite difficult to obtain capital from a bank and therefore the stock market development was pushed from the inside.

strengthens, some companies can no longer manage to meet these requirements and have to leave the public market. The second scenario materializes when a certain limited number of securities is traded publicly and are subject to strict regulation, while the rest remain "quasi-public" and are subject to relatively weak regulation (e.g. Slovenia). This so-called dual approach enables the stock market to develop simultaneously at the high and low end of the market.

The two main approaches to stock market creation relate to the privatization method implemented in certain countries (Table A1.1 in the appendix). However, as there are different modifications of privatization methods, stock market creation can also be difficult to classify into one of the above-mentioned categories. In more general terms, Fine and Karlova (1998) ascribe the distinct path of stock market development in transition countries to the following factors: the design of the privatization program in individual countries, the degree of stock market development at the beginning of the program, and different approaches to stock market regulation. Moreover, the availability of other sources of capital in addition to the stock market also plays an important role.

All in all, the role of finance in fostering economic growth is especially important in transition countries. The emerging stock markets and their development differ a lot in these economies. Our previous discussion suggests that the important role the privatization has played in the process of stock market formation has not been researched sufficiently so far. This is the phenomenon that we further examine empirically.

1.6 Methodology and data

To investigate the influence of mass privatization on the emerging stock markets we consider the starting hypothesis that mass privatization in the transition countries did not affect the development of their stock markets. The alternative claims that mass privatization has influenced stock market development. Based on the above discussion we expect that it has exhibited a negative influence on their functioning, especially in the short and medium run. The formal model specification accounts for the effect of privatization together with the country effect in the following way:

$$market\_ind_{i,t} \;=\; country_i + \beta_1 \cdot priv_{i,t} + \beta_2 \cdot tr \cdot priv_{i,t} + \varepsilon_{i,t}, \qquad (1.1)$$

where the relevant groups of variables are defined as follows:

- *market_ind* stands for an indicator of stock market development (market capitalization, turnover ratio, value traded, new capital raised) in country i at time t;

- *country* stands for country effect concerning country i;

- *priv* is a dummy variable that equals 1 starting from the year mass privatization was implemented in country i and 0 otherwise;

- *tr* stands for linear trend that is added to the privatization dummy variable.

Since the privatization method of our primary concern is mass privatization, the estimated specification includes a dummy variable for mass privatization. As, based on our conjecture, this privatization method exhibits a special impact on the emerging stock market, we only distinguish between mass privatization on one hand and other privatization methods on the other. Mass privatization dummy variable is considered exogenous and we include it with as well as without linear trend. The dummy variable without trend is meant to uncover the average effect of mass privatization on the stock market. The second dummy variable which accounts for linear trend is included because we anticipate the impact of privatization to evolve during the transition period due to the consolidation of ownership structure of privatized companies following the actual privatization. This process took several years and, in the majority of cases, was intermediated by the stock market. Consequently, most trades that took place on the stock exchanges depended heavily on the privatization method and its progress. By considering both dummy variables, we intend to investigate the interaction of the initial effect of privatization and its evolution over time as well.

It has already been noted that the implementation of mass privatization usually took several years and thus its impact on stock markets could not be observed in the same year the privatization started. We take this into account by estimating the above-described specification first as contemporaneous effect and then with one and two years lags.

All the estimations are done using country specific fixed effects. We estimate the effect of privatization on stock market development by considering the privatization and

country effects together (equation 1.1). We control only for privatization and country effects at this stage, as our primary objective is to uncover if the effect of privatization is present in the data, that is, if privatization has had any influence on stock market development in transition countries at all. Even though controlling for country effects may be considered too broad a variable, in fact it contains all the country specific characteristics we need to account for. Therefore this is a much more general indicator than using only certain selected economic variables[26]. By casting a wide net, we avoid the problem of possible model misspecification, since it is especially challenging to identify those economic variables that are truly crucial for stock market development in the case of transition countries.

1.6.1 Data

Our data comes primarily from the World Development Indicators Database, available from the World Bank. Where indicated, the data set is supplemented by data from the World Federation of Exchanges as well as by local stock exchange figures. Dummy variables for mass privatization are constructed based on different issues of the Transition Report published by EBRD. A definition and brief description of the most important variables used in this study are provided in appendix in Table A1.6 and Table A1.7.

In order to investigate whether and to what extent the privatization methods in transition economies influenced the actual emergence and development of their stock markets, we look at a sample of the former communist countries. Altogether there are 27 states in Central and Eastern Europe and Central Asia considered to be transition economies. Based on the availability of data, the majority of them is included in our

---

[26] These variables concern the overall economic development of the country, its stability, other available channels of financial intermediation, as well as the legal and institutional environment. However, due to the nature of our sample and the unavailability of a significant part of the necessary data for transition economies, the inclusion of these factors would lead to serious difficulties in econometric estimations. There would be an insufficient number of observations, plus an endogeneity problem could arise when using some economic variables as explanatory variables. Unfortunately, standard methods of dealing with this problem are very difficult to apply in the case of transition economies because it is practically impossible to find an appropriate instrument. And even if we were able to come up with some reasonable one, it is usually impossible to obtain reliable data for it. A two-stage estimation would require even more variables, leading us straight into the data availability problem again.

investigation. The list of countries and variables covered is provided in Table A1.5 in the appendix.

Since our intention is to investigate the short and medium effect of privatization method on stock market development, the time period under consideration covers the transition period from 1990 to 2003. In the long run, there exist other important factors significantly influencing stock market (e.g. entering EU) and it would be become increasingly difficult to disentangle just the influence of the privatization method. Nevertheless, our data constitutes an unbalanced panel because stock markets were established at different points in time in different countries. Moreover, not all transition countries have proceeded far enough in the transition process to make it possible to investigate the aforementioned link there. Therefore this unbalanced panel is the result of "true" missing values as well as observations that are not available due to the non-existence of a stock market[27].

Yet another problem causing an unbalanced panel is the quality of the available data. Even though data exists for certain countries, care must be taken to examine the data before using them and, if necessary, to "clean" them for further estimations. Such "cleaning" is needed because the nature of transition economies leads to observations that cannot be included in the data set. It is, however, not possible to stipulate exact rules on which we made our decisions, as they were primarily based on original country data. In our case, the estimation results may be easily spoiled by growth rates recorded in the thousands of percent for cases when a certain newly-created stock exchange traded during a time period shorter than one year, or when it took several years before even some trading was initiated[28]. Frequent organizational changes on the stock exchanges and other exogenous factors have in some instances also influenced the actual figures and thus need

---

[27] We do not assign a "zero" value for those countries where the stock market did not exist at the beginning of transition because such an approach would result in an artificially balanced panel. Even though this would not change the estimated coefficients, t-statistics could be affected significantly and through them the results of the whole hypothesis testing.

[28] This was the case, for example, in Croatia (1994, 1995 and only in 1996 did the stock exchange begin to pick up), Latvia (the stock exchange was founded in 1993, trading started in 1995, and only in 1996 did the situation stabilize to a certain extent), Lithuania (trading officially started in 1993 but the figures are very low until 1995; in 1996 it began to stabilize), Moldova (official beginning in 1995 but trading lively only in 1997), and Romania (started operation in 1995 but reasonable trading only in 1997).

to be accounted for[29]. Another exogenous influence was the Russian crisis. All of these problems were taken into account when cleaning the data and constructing the actual data set, so observations that could potentially damage the analysis have either been omitted or have been remedied by creating suitable dummy variables.

1.6.2 Measures of stock market development

We measure stock market development using standard indicators of market size and liquidity which have been used in the studies investigating development of stock markets and its connection to economic growth (Levine and Zervos, 1998; Demirguc-Kunt and Maksimovic, 1998; Rousseau and Wachtel, 2000; Beck and Levine, 2004). Unlike these studies, this analysis deals with transition economies and therefore we find it important to add another measure of stock market development, new capital raised.

The most frequently used indicator of market size is the market capitalization. It reflects the total value of domestic shares listed on a certain stock exchange. Ideally, this measure shows the importance of financing through equity issues. To enable comparison among countries, market capitalization can be expressed as a percentage of GDP. However, larger markets do not have to perform better, as the size does not necessarily reflect their effectiveness. This is of particular interest especially in countries where the number of listed companies results from the implemented privatization method. Under mass privatization with mandatory stock listing, this indicator of market size can be significantly inflated because the majority of stocks that are listed are traded only occasionally, or not at all. Consequently, market capitalization does not necessarily have to reflect the real stock market activity. This problem could be solved by using data from the first tier of the market, which usually includes companies that are actually traded. However, such data are not available from all the transition economies' stock exchanges and, what's even worse, the rules for including companies in the first tier differ from country to country. Nevertheless, the market capitalization to GDP variable is used in our

---

[29] The merger of several exchanges into a new entity (Kazakhstan in 1997, Bulgaria in 1998), the decision of stock exchange authorities to list a certain group of securities that had not been listed before (Latvia in 1999), the macroeconomic development in a given country (Poland in 1993), and trading system enhancements initiated by the stock exchange and liberalization of block trading (Lithuania in 1997).

analysis to show the influence of different privatization methods on the size of the emerging stock market.

In contrast to the market capitalization variable, the indicators of liquidity do indeed reflect the real stock market activity, and are not "spoiled" by a high number of non-traded stocks listed on a particular stock exchange. Moreover, Rousseau and Wachtel (2000) consider increases in this measure essential especially for emerging markets, since higher liquidity raises investors' confidence in the values of information and risk diversification associated with trading, which further encourages the inflow of capital.

We employ two measures of liquidity. The first one, market turnover ratio, can be expressed in currency units or as a share of market capitalization. Share of market capitalization reflects the value of stocks traded divided by the value of listed stocks; that is, trading relative to the size of the stock market. The second measure of market liquidity is value traded, which equals the value of stocks trading divided by GDP. Hence, it relates the value of trading to the size of the whole economy and does not really measure the liquidity of the market (Beck and Levine, 2004). This indicator faces a potential problem, however, if prices of stocks increase because of expectations concerning higher corporate profits. In such a situation this liquidity measure, as well as market capitalization, would increase without a rise in the number of transactions, thus not reflecting the true stock market activity. To eliminate this price effect, Levine and Zervos (1998) suggest either using both capitalization and value traded together, or using turnover indicator instead. Turnover ratio is not influenced by price changes as it contains the price in both numerator and denominator. Therefore, based on the available data we primarily use this measure as an indicator of stock market development in the transition countries.

Another indicator that we employ to monitor the development of stock markets in transition economies is the amount of new capital raised through a particular stock exchange. In this respect we are interested not only in capital raised by already existing companies, but primarily by newly admitted enterprises (IPOs). In most of transition economies, however, the number of IPOs was insignificant, especially in relation to market capitalization. Nevertheless, we consider new capital raised to be very important,

as it shows the real functioning of the market and fulfilling its main role of providing financial resources to enterprises. But even though this indicator may seem appropriate, one has to be aware of its possible shortcomings, namely the fact that data on new capital raised in the context of transition economies do not necessarily reflect the real situation, since not everything recorded as "new capital raised" conforms to its true definition[30].

As an example we provide the problem of mergers: in some cases these were recorded as new capital raised, whereas in fact this was capital that had already existed on the stock exchange, only under a different name. Another possibility concerns changes in ISIN that could result in recording an issue with a new ISIN as new capital even though it was simply different "labeling" of this capital. In our analysis, we only use data from one source in which the above-described problems are already accounted for, although the disadvantage is that such data is available only for a limited number of countries[31].

All in all, in order to investigate the development of transitional stock markets from different perspectives we employ the following variables: market capitalization to GDP; total value of stocks traded as a percentage of GDP; turnover ratio; and total amount of new capital raised as a percentage of market capitalization. We conjecture that the negative effect of privatization is going to influence different variables in a different way, based on their nature. We anticipate a sudden increase of market capitalization after mass privatization, while on the other hand stocks traded and turnover ratio as the indicators of liquidity are expected to decrease, especially over the medium term. When employing new capital raised the same pattern as for liquidity measures is expected.

The above discussion suggests that all of these stock market indicators face some potential shortcomings. Nevertheless, taken together, they can provide a reasonable picture of tendencies in stock market development in transition countries.

---

[30] The World Federation of Exchanges defines new capital raised by shares to be the amount of new capital raised through the sale of new shares issued by a new issuer (company) through an Initial Public Offering (IPO), capital increases by already listed companies (reserved to previous shareholders), and SPOs (new shareholders subscribe the shares). This is the definition that we also adhere to.

[31] In this case there are 14 of them.

1.7 Estimation results

The outcome of our estimation is discussed according to the stock market indicators used as dependent variables.

- MARKET CAPITALIZATION TO GDP

Results showing the influence of mass privatization on market capitalization as a percentage of GDP are provided in the following Table 1.2.

Table 1.2: Estimations of the main model for market capitalization to GDP

MARKET CAPITALIZATION TO GDP	Coefficient	Standard error	R^2	R^2 (within)
Contemporaneous effect				
Privatization dummy (priv)	1.523	2.468	0.114	0.271
Privatization dummy with trend (tr.priv)	1.454 ***	0.206		
One year lag				
Privatization dummy (priv)	2.767	2.213	0.116	0.272
Privatization dummy with trend (tr.priv)	1.406 ***	0.219		
Two years lag				
Privatization dummy (priv)	3.3 *	1.845	0.128	0.268
Privatization dummy with trend (tr.priv)	1.354 ***	0.237		
Observation/country	195/23			

Note: The table contains results for fixed effect regression. We report estimated coefficients as well as their significance (***significant at 1%, ** significant at 5% and * significant at 10%) and standard errors. Constant term is included but not reported.

The estimated coefficients are positive and mostly significant. This is in line with our expectations of the positive influence of mass privatization on market capitalization. The coefficients for dummy variables including linear trend are all significant, indicating the evolving influence of mass privatization on stock market development. The privatization dummy variable without trend is only significant when two years lag is considered. As expected, this coefficient is positive due to the fact that the shares of privatized companies were simply put on the market in the majority of countries. The significance of the lag only is most probably the result of the time gap between the official start of privatization and its real implementation when companies finally entered the stock exchange. It suggests that privatization did not greatly influence stock markets initially.

Within R^2 is much higher than overall R^2 which confirms the importance of country specific fixed effects. This is a natural consequence of the fact that the economic environment in individual transition economies varied considerably, especially with respect to the different initial conditions and sequencing of reforms.

- GROWTH IN STOCKS TRADED

As expected, the impact of privatization on the growth in value of stocks traded (as % of GDP) is negative and mostly significant. While most coefficients are significant, the R^2 measure is much lower than in the case of market capitalization. We posit that the value of stocks traded in comparison to market capitalization was likely influenced by privatization only indirectly.

Table 1.3: Estimations of the main model for growth in stocks traded

GROWTH IN STOCKS TRADED	Coefficient	Standard error	R^2	R^2 (within)
Contemporaneous effect				
Privatization dummy (priv)	-3.748 ***	0.934	0.031	0.197
Privatization dummy with trend (tr.priv)	-0.12 **	0.063		
One year lag				
Privatization dummy (priv)	-0.347	0.723	0.030	0.068
Privatization dummy with trend (tr.priv)	-0.169 ***	0.073		
Two years lag				
Privatization dummy (priv)	-0.728	0.639	0.032	0.074
Privatization dummy with trend (tr.priv)	-0.146 **	0.077		
Observation/country	132/21			

Note: The table contains results for fixed effect regression. We report estimated coefficients as well as their significance (***significant at 1%, ** significant at 5% and * significant at 10%) and standard errors. Constant term is included but not reported.

As Table 1.3 reveals, the immediate effect of privatization on stock trading is significant only in the first case when the effect of privatization is not lagged. The introduction of huge numbers of new shares to the stock exchange might have confused investors and thus they needed time to adjust to the new situation and start their trading activities again. The negative effect is also reflected in significant results for the privatization dummy variable that includes linear trend. Thus, trading as an indicator of

stock market liquidity crucial for healthy stock market development is, in fact, negatively influenced by mass privatization and traditional stock market development is thwarted.

Despite the fact that the negative effect of mass privatization persists with time, we do not consider it permanent; it relates solely to the transition period that we investigate. Recent development of stock indices in major transition countries supports this statement.[32] Regardless of initial problems and related costs, market forces have tended to win out over the long run and contribute to the stabilization of stock markets in transition economies.

- TURNOVER RATIO

This is another indicator of stock market functioning that supports our previous results and the initial hypothesis. We consider the following outcome even more important, especially due to the better quality of the turnover ratio indicator which is not spoiled by price changes or by a high number of listed companies after privatization, and which reflects the true liquidity of the market.

Table 1.4 shows that the average effect of mass privatization is significant for all three specifications. All significant coefficients are negative, which only substantiates the unfavorable influence of privatization on stock markets.

Table 1.4: Estimations of the main model for turnover ratio as dependent variable

TURNOVER RATIO	Coefficient	Standard error	R^2	R^2 (within)
Contemporaneous effect				
Privatization dummy (priv)	-72.448 ***	17.77	0.117	0.211
Privatization dummy with trend (tr.priv)	-1.523	1.209		
One year lag				
Privatization dummy (priv)	-43.612 ***	15.03	0.101	0.137
Privatization dummy with trend (tr.priv)	-1.594	1.303		
Two years lag				
Privatization dummy (priv)	-24.887 **	12.968	0.08	0.081
Privatization dummy with trend (tr.priv)	-1.678	1.399		
Observation/country	112/18			

Note: The table contains results for fixed effect regression. We report estimated coefficients as well as their significance (***significant at 1%, ** significant at 5% and * significant at 10%) and standard errors. Constant term is included but not reported.

---

[32] The Prague Stock Exchange index PX50 recovered to its initial 1994 level of 1,000 only in 2004.

● NEW CAPITAL RAISED

This indicator of stock market development accounts for the capital raised through IPOs in transition countries. With the exception of Poland, there have been just a few IPOs in other transition countries and thus the number of observations for this indicator of stock market development is lower than in the previous cases. This fact most probably also influences the R^2 measure. Nevertheless, the importance of this indicator has increased over time as IPOs on the stock markets of transition countries have become more common.

The estimated coefficients are significant only in the case when linear trend is taken into account (see Table 5.1). It is obvious that privatization cannot influence the amounts of new capital raised immediately since the process of raising capital requires a lot of preparations and takes a lot of time. The estimated coefficients that are significant all exhibit negative sign, which is in line with our hypothesis that mass privatization had negative influence on the functioning of the emerging stock markets.

Table 1.5: Estimations of the main model for new capital raised as dependent variable

NEW CAPITAL RAISED	Coefficient	Standard error	R^2	R^2 (within)
Contemporaneous effect				
Privatization dummy (priv)	5801.7	12303.4	0.014	0.077
Privatization dummy with trend (tr.priv)	-1263 ***	527.2		
One year lag				
Privatization dummy (priv)	4568.1	7648.1	0.016	0.080
Privatization dummy with trend (tr.priv)	-1331.3 **	545.2		
Two years lag				
Privatization dummy (priv)	5446.9	5850.6	0.026	0.089
Privatization dummy with trend (tr.priv)	-1481.3 ***	571.9		
Observation/country	85/14			

Note: The table contains results for fixed effect regression. We report estimated coefficients as well as their significance (***significant at 1%, ** significant at 5% and * significant at 10%) and standard errors. Constant term is included but not reported.

1.7.1 Robustness check

We have checked robustness of our results by implementing several robustness checks. First, in all of the above-described estimations, we included a dummy variable for the

1998 Russian crises. As the influence of the crises was not strong enough in all transition countries, this dummy variable did not figure significantly in our estimations.

Another modification of the basic model that we test is the inclusion of a quadratic trend. We consider all the modifications of the main model with different lags and dependent variables to which we include privatization dummy variable with quadratic trend. The results that we obtain reveal the same pattern as our main results.

Last but not least, estimations of the basic model with several different measures of stock market performance that provide consistent results supporting negative influence of mass privatization can also be considered a robustness check for our results.

In our view, the simple estimation procedure performed above is appropriate both with respect to the data sample we have available and to the main objective of our investigation – uncovering a possible connection between mass privatization and stock market development. Data sufficiency problems occur if we want to include the development of stock markets over time as an inseparable part of the transition process. In such a case, we would need to add a trend for each country's development. This kind of estimation is not possible with the small data sample as we have available. If more data is available, we expect further research in this area will be feasible.

1.8 Conclusion

We use available data from a majority of transition economies to provide empirical evidence for our hypothesis that mass privatization influenced stock market development and exerted a negative impact on stock market functioning in these countries. The results of our estimation, which accounted for privatization method and country effects, validated the hypothesis in the short and medium run. The connection between mass privatization and stock market development was confirmed using different indicators of stock market development.

In accordance with our expectations, market capitalization to GDP increased following mass privatization which could in general mean a good news for the emerging markets. Nevertheless, increasing market capitalization alone is not enough, bigger market does not necessarily need to be a more efficient one. If this was connected with

increasing liquidity and more capital raised, only then we could have concluded that privatization contributed to positive development of the emerging stock markets. Nevertheless, this was not the case in transition countries. Our liquidity indicators confirm that most shares traded occasionally or not at all resulting in negative coefficients for privatization dummy variable when the value of stocks traded and the turnover ratio were used to measure stock market development. This trend was quite visible over the medium term. Moreover, we find negative connection between mass privatization and the amounts of new capital raised which indicates that the emerging markets are not able to perform one of their main functions.

Our results further imply that in countries using mass privatization approaches, the stock market was established and perceived only as a by-product of the privatization process. These stock markets did not initially fulfil their main economic function of providing capital resources to enterprises. Such non-transparent markets offering thousands of securities naturally diminished investor confidence and did little to jump-start economic growth in transition economies. Despite an unfavourable beginning, the main stock indices in transition economies have shown improvement in last years. It seems that resources in the transition economies would have been used more efficiently had a more careful approach to stock market creation been adopted.

REFERENCES

Ahdieh R.B. (2003): "Making Markets: Network Effects and the Role of Law in the Creation of Strong Securities Markets," *Southern California Law Review* (76): 277.

Bakker M., Gross A. (2004): "Development of Non-bank Financial Institutions and Capital Markets in European Union Accession Countries," World Bank Working Paper No. 28.

Beck T., Levine R. (2004): "Stock Market, Banks and Growth: Panel Evidence," *Journal of Banking and Finance* 28(3): 423 - 442.

Bennett J., Estrin S., Maw J., Urga G. (2004): "Privatization Methods and Economic Growth in Transition Economies," CEPR Discussion Paper No. 4291.

Berg A., Borensztein E., Sahay R., Zettelmeyer J. (1999): "The Evolution of Output in Transition Economies: Explaining the Differences," IMF Working Paper, WP/99/73.

Berglof E., Bolton P. (2003): "The Great Divide and Beyond – Financial Architecture in Transition," CEPR Discussion Paper No. 3476.

Biais B., Perotti E. (2002): "Machiavellian Privatization," *American Economic Review* 92(1): 240-258.

Bonin J., Wachtel P. (2002): "Financial Sector Development in Transition Economies: Lessons from the First Decade," Bank of Finland Institute for Economies in Transition, DP No.9.

Brada J. (1996): "Privatization Is Transition – Or Is It?" *Journal of Economic Perspectives* 10: 67 – 86.

Campos N., Coricelli F. (2002): "Growth in Transition: What We Know, What We Don't and What We Should," *Journal of Economic Literature* 40(3): 793-836.

Claessens S., Djankov S., Klingebiel D. (2000): "Stock Markets in Transition Economies," Financial Sector Discussion Paper No.5, The World Bank.

Claessens S., Lee R., Zechner J. (2003): "The Future of Stock Exchanges in European Union Accession Countries," CEPR report, published by the Corporation of London, available at http://www.cepr.org/pubs/fse/

Czech Republic: Capital Market Review (1999), The World Bank Washington, D.C.

De Melo M., Denizer C., Gelb A., and Tenev S. (1997): "Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies", World Bank

Policy Research Working Paper No. 1866.

Demirguc-Kunt A., Maksimovic V. (1998): ''Law, Finance and Firm Growth,'' *Journal of Finance* 53(6): 2107 – 2137.
Davis E. P. (2001): ''Multiple Avenues of Intermediation, Corporate Finance, and Financial Stability,'' IMF Working Paper, WP/01/115.

Djankov S., Murrell P. (2002): ''Enterprise Restructuring in Transition: A Quantitative Survey,'' *Journal of Economic Literature* 40(3): 739-792.

Estrin, S., Hanousek, J., Kočenda, E., Svejnar, J.(2009): "Effects of Privatization and Ownership in Transition Economies," *Journal of Economic Literature* (forthcoming).

Estrin S., Stone R. (1997): ''Taxonomy of Mass Privatization,'' In Lieberman I., Stilpon N., Raj D. (Eds): *Between State and Market: Mass Privatization in Transition Economies*, The World Bank and OECD.

EBRD (European Bank for Reconstruction and Development), 1995 – 2006: Transition Report.

Falcetti E., Raiser M., Sanfey P. (2001): ''Defying the Odds: Initial Conditions, Reforms and Growth in the First Decade of Transition,'' EBRD Working Paper No.55.

Fine G., Karlova E. (1998): ''Privatization and the New Securities Markets in the Czech Republic, Poland and Russia,'' In Lieberman I., Kirkness Ch.: *Privatization and Emerging Equity Markets*, co-published by The World Bank and Flemings Washington, D.C.

Fischer S., Sahay R. (2000): ''The Transition Economies After Ten Years,'' IMF Working Paper, WP/00/30.

Garcia Valeriano F., Giorgio Luis A. (2003): ''The Impact of the Macroeconomic Environment on Capital Markets in Emerging Latin American Economies'' In Dowers K., Masci P. (Eds.): ''*Focus on Capital: New Approaches to Developing Latin American Capital Markets*,'' Inter-American Development Bank, Washington D.C.

Gupta N., Ham J., Švejnar J. (2000): ''Priorities and Sequencing in Privatization: Theory and Evidence from the Czech Republic,'' William Davidson Institute Working Paper No. 323.

Hanousek J., Filer R. (2000): ''The Relationship between Economic Factors and Equity Markets in Central Europe,'' *Economics of Transition* 8(3): 623 - 638.

Hanousek J., Kočenda E. (2003): ''The Impact of Czech Mass Privatization on Corporate Governance,'' *Journal of Economic Studies* 30(3/4): 278-293.

References

Hanousek, J., Kočenda E., Švejnar J. (2007): "Origin and Concentration: Corporate Ownership, Control and Performance in Firms After Privatization," *Economics of Transition*: 15(1), 1-31.

Hanousek J., Tůma Z. (2002): "A Test of the Permanent Income Hypothesis on Czech Voucher Privatization," *Economics of Transition*, 10 (2): 235-254.

Henry P. B. (2000): "Stock Market Liberalization, Economic Reform, and Emerging Market Equity Prices," *Journal of Finance* 55(2): 529 – 64.

King R., Levine R. (1993): "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics* 108(3): 717 – 738.

Kočenda E. (1999): "Residual State Property in the Czech Republic," *Eastern European Economics* 37(5): 6 – 35.

Kočenda E., Valachy J. (2002): "Firm Ownership Structures: Dynamic Development," *Prague Economic Papers* 11(3): 255 – 268.

Köke J., Schröder M. (2002): "The Prospects of Capital Markets in Central and Eastern Europe," Centre for European Economic Research (ZEW) Discussion Paper No. 02-57.

Korhonen I., Kuus T., Zirnask V. (2000): "Baltic Securities Markets," Bank of Finland, Institute for Economies in Transition (BOFIT), DP No.5.

La Porta R., Lopez-de-Silanes F., Shleifer A., Vishny R. (1997): "Legal Determinants of External Finance," *Journal of Finance* 52(3): 1131 – 1150.

La Porta R., Lopez-de-Silanes F., Shleifer A., Vishny R. (1998): "Law and Finance," *Journal of Political Economy* 106(6): 1113 – 1155.

La Porta R., Lopez-de-Silanes F., Shleifer A., Vishny R. (2000): "Investor Protection and Corporate Governance," *Journal of Financial Economics* 58: 3 – 27.

Levine R., Zervos S. (1998): "Stock Markets, Banks, and Economic Growth," *American Economic Review* 88: 537 – 558.

Lízal L., Švejnar J. (2001): "Investment, Credit Rationing, and the Soft Budget Constraint: Evidence From Czech Panel Data," *The Review of Economics and Statistics* 84(2): 353 – 370.

Pajuste A. (2002): "Corporate Governance and Stock Market Performance in Central and Eastern Europe: A Study of Nine Countries, 1994 – 2001," SSRN Electronic Journal, available at http://ssrn.com/abstract=310419

Perotti E. C., van Oijen P. (2001): "Privatization, Political Risk and Stock Market Development in Emerging Economies," *Journal of International Money and Finance*, 20: 43-69.

Pistor K., Raiser M., Gelfer S. (2000): "Law and Finance in Transition," *Economics of Transition* 8(2): 325 – 368.

Roland G. (2001): "Ten Years After….Transition and Economics," *IMF Staff Papers* 48, Special Issue.

Rousseau P., Wachtel P. (2000): "Equity Markets and Growth: Cross-country Evidence on Timing and Outcomes, 1980 – 1995," *Journal of Banking and Finance* 24: 1933 – 1957.

Rozlucki W. (2001): "Emerging Stock Markets in Central Europe: Where Do We Stand?" In Bokros L., Fleming A., Votava C.: *Financial Transition in Europe and Central Asia: Challenges of the New Decade*, The International Bank for Reconstruction and Development / The World Bank.

Simoneti M. (1997): "Regulating Post-privatization Securities Markets in Transition Economies," In Lieberman I., Stilpon N., Raj D. (Eds): *Between State and Market: Mass Privatization in Transition Economies*, The World Bank and OECD.

Stiglitz J. (1999): "Whither Reform? Ten Years of the Transition," Annual Bank Conference on Development Economics, Washington, World Bank.

Zinnes C., Eilat Y., Sachs J. (2001): "The Gains from Privatization in Transition Economies: Is 'Change of Ownership' Enough?" *IMF Staff Papers* 48, Special Issue.

Wagner N., Iakova D. (2001): "Financial Sector Evolution in the Central European Economies: Challenges in Supporting Macroeconomic Stability and Sustainable Growth," IMF Working Paper 01/141.

World Bank (2002): "Transition. The First Ten Years: Analysis and Lessons for Eastern Europe and the Former Soviet Union, " Washington D. C.

World Bank Operations Evaluation Department (2004): "Economies in Transition: An OED Evaluation of World Bank Assistance," Conference Edition, The World Bank Washington D. C.

World Development Report 1996: "From Plan to Market," Oxford University Press

Yartey Ch. (2008): "The Determinants of Stock Market Development in Emerging Economies: Is South Africa different?" IMF Working Paper 08/32.

APPENDIX 1

Table A1.1: Primary and secondary privatization method implemented in transition
countries

Country	Primary method			Secondary method		
	Direct sales	MEBOs	Vouchers	Direct sales	MEBOs	Vouchers
Albania		*				*
Armenia	99→		→99		*	
Azerbaijan^X	01→		*	*		2001→
Belarus		*				*
Bosnia and Herzegovina			* (99→)	*(99→)		
Bulgaria	*					*
Croatia		*				*
Czech Republic			*	*		
Estonia	*					*
FYR Macedonia		*		*		
Georgia			*	*		
Hungary	*				*	
Kazakstan	99→		*	*		99→
Kyrgyz Republic			*		*	
Latvia	99→		*	*		99→
Lithuania			*	*		
Moldova			*	*		
Poland	*				*	
Romania		*		*		
Russia			*	*		
Serbia and Montenegro	Serbia		Monten.	*		
Slovak Republic	*					*
Slovenia		*				*
Tajikistan	99, 2002→	98,2001		2000, 2001	2002→	98,99
Turkmenistan		*		*		
Ukraine			*		*	
Uzbekistan		*		*		

Source: EBRD Transition Reports (1998 –2004)

Note: Data for Serbia and Montenegro are available only from 2003
    X – Direct sales in Azerbaijan took the form of cash auctions in 2000 and
        then were also used since 2002.

Table A1.2: Taxonomy of mass privatization

Country	Year voucher distribution began	Shares issued in waves - W or continuously -C	Vouchers	Investment in funds	Fund management
Albania	1995	Continuously	Bearer	Encouraged	Independent
Belarus	1995	Continuously	Bearer	Encouraged	Self-managed
Russia	1992	Continuously	Bearer	Encouraged	Self-managed
Armenia	1994	Continuously	Bearer	Allowed	Independent
Kyrgyz Republic	1994	Continuously	Bearer	Allowed	Independent
Estonia	1993	Continuously	Tradable	Allowed	Independent
Georgia	1995	Continuously	Tradable	Allowed	Self-managed
Latvia	1994	Continuously	Tradable	Allowed	
Lithuania	1993	Continuously	Nontradable	Allowed	Independent
Slovenia	1994	Continuously	Nontradable	Allowed	Independent
Ukraine	1995	Continuously	Nontradable	Allowed	Self-managed
Bulgaria	1995	Waves	Nontradable	Encouraged	Self-managed
Czech Republic	1992	Waves	Nontradable	Encouraged	Independent
Moldova	1994	Waves	Nontradable	Encouraged	Independent
Slovak Republic	1992	Waves	Nontradable	Encouraged	Self-managed
Kazakhstan	1994	Waves	Nontradable	Compulsory	Independent
Poland	1995	Waves	Nontradable	Compulsory	Independent
Romania	1992	Waves	Nontradable	Compulsory	Self-managed
Romania	1995	Waves	Nontradable	Encouraged	

Source: Estrin S., Stone R. (1997): "Taxonomy of Mass Privatization," In Lieberman I., Stilpon N., Raj D. (Eds): *Between State and Market: Mass Privatization in Transition Economies*, The World Bank and OECD.

Table A1.3: Models of mass privatization

MODEL	CHARACTERISTICS	OTHER COUNTRIES FOLLOWING THE MODEL
Russian	shares issued continuously bearer vouchers funds encouraged	Belarus
Armenian	shares issued continuously bearer vouchers funds allowed	Georgia [a] Kyrgyz Republic
Lithuanian	shares issued continuously nontradable vouchers funds allowed	Estonia [b] Latvia [b] Slovenia Ukraine
Czech-Slovak	shares issued in waves nontradable vouchers funds encouraged	Bulgaria Moldova Romania (1995)
Polish	shares issued in waves nontradable vouchers funds compulsory	Kazakhstan Romania (1992)[c]

Source: Estrin S., Stone R. (1997): "Taxonomy of Mass Privatization," In Lieberman I., Stilpon N., Raj D. (Eds): *Between State and Market: Mass Privatization in Transition Economies*, The World Bank and OECD.
Notes:
a. it is not clear whether vouchers are bearer or registered
b. vouchers tradable for all or part of their validity
c. certificates of ownership in the funds were distributed in one wave but the exchange of the certificates for shares

Table A1.4: EBRD indicators of financial system reform for transition countries

CENTRAL EASTERN EUROPE AND THE BALTICS (CEB)

Country	EBRD index of	1995	1996	1997	1998	1999	2000	2001	2002	2003
Czech Republic	banking sector reform	3.0	3.0	3.0	3.0	3.3	3.3	3.7	3.7	3.7
	reform of non-bank financial institutions	2.7	2.7	2.7	3.0	3.0	3.0	3.0	3.0	3.0
Estonia	banking sector reform	3.0	3.0	3.3	3.3	3.7	3.7	3.7	3.7	3.7
	reform of non-bank financial institutions	1.7	2.0	3.0	3.0	3.0	3.0	3.0	3.3	3.3
Hungary	banking sector reform	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	reform of non-bank financial institutions	3.0	3.0	3.3	3.3	3.3	3.7	3.7	3.7	3.7
Latvia	banking sector reform	3.0	3.0	3.0	2.7	3.0	3.0	3.3	3.7	3.7
	reform of non-bank financial institutions	2.0	2.0	2.3	2.3	2.3	2.3	2.3	3.0	3.0
Lithuania	banking sector reform	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	reform of non-bank financial institutions	2.0	2.0	2.3	2.3	2.7	3.0	3.0	3.0	3.0
Poland	banking sector reform	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3	3.3
	reform of non-bank financial institutions	3.0	3.0	3.3	3.3	3.3	3.7	3.7	3.7	3.7
Slovak Republic	banking sector reform	2.7	2.7	2.7	2.7	2.7	3.0	3.3	3.3	3.3
	reform of non-bank financial institutions	2.7	2.7	2.3	2.3	2.3	2.3	2.3	2.3	2.7
Slovenia	banking sector reform	3.0	3.0	3.0	3.0	3.3	3.3	3.3	3.3	3.3
	reform of non-bank financial institutions	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

SOUTH EAST EUROPE (SEE)

Albania	banking sector reform	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	1.0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Bosnia and Herzegovina	banking sector reform	1.0	1.0	1.0	2.3	2.3	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	1.7
Bulgaria	banking sector reform	2.0	2.0	2.7	2.7	2.7	3.0	3.0	3.3	3.3
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3
Croatia	banking sector reform	2.7	2.7	2.7	2.7	3.0	3.3	3.3	3.7	3.7
	reform of non-bank financial institutions	2.0	2.0	2.3	2.3	2.3	2.3	2.3	2.7	2.7
FYR Macedonia	banking sector reform	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	reform of non-bank financial institutions	1.0	1.0	1.0	1.7	1.7	1.7	1.7	1.7	1.7
Romania	banking sector reform	3.0	3.0	2.7	2.3	2.7	2.7	2.7	2.7	2.7
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Serbia and Montenegro	banking sector reform	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.3	2.3
	reform of non-bank financial institutions	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	2.0

COMMONWEALTH OF INDEPENDENT COUNTRIES (CIS)

Country	EBRD index of	1995	1996	1997	1998	1999	2000	2001	2002	2003
Armenia	banking sector reform	2.0	2.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
Azerbaijan	banking sector reform	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3	2.3
	reform of non-bank financial institutions	1.0	1.0	1.0	1.7	1.7	1.7	1.7	1.7	1.7
Belarus	banking sector reform	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	1.7
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Georgia	banking sector reform	2.0	2.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	1.0	1.0	1.0	1.0	1.0	1.7	1.7	1.7	1.7
Kazakhstan	banking sector reform	2.0	2.0	2.3	2.3	2.3	2.3	2.7	2.7	3.0
	reform of non-bank financial institutions	1.7	1.7	1.7	2.0	2.0	2.3	2.3	2.3	2.3
Kyrgyz Republic	banking sector reform	2.0	2.0	2.7	2.7	2.3	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	1.7	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Moldova	banking sector reform	2.0	2.0	2.0	2.3	2.3	2.3	2.3	2.3	2.3
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Russia	banking sector reform	2.0	2.0	2.3	2.0	1.7	1.7	1.7	2.0	2.0
	reform of non-bank financial institutions	2.0	3.0	3.0	1.7	1.7	1.7	1.7	2.3	2.7
Tajikistan	banking sector reform	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	1.7
	reform of non-bank financial institutions	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Turkmenistan	banking sector reform	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	reform of non-bank financial institutions	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Ukraine	banking sector reform	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.3
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Uzbekistan	banking sector reform	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
	reform of non-bank financial institutions	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Source: EBRD Transition reports

Note: value 1 in both cases corresponds to little progress in the reform, value 4+ represents the standards and performance norms of advanced industrial economies.

Table A1.5: Stock market development indicators of transition countries and their comparison with developed economies

Country	Market capitalization to GDP	Stocks traded (% of GDP)	Turnover ratio
Armenia	0.75	0.03	5.77
Azerbaijan	0.07	na	na
Belarus	3.66	na	na
Bulgaria	4	0.4	13.07
Croatia	13.96	0.87	4.18
Czech Republic	20.83	8.51	42.11
Estonia	27.49	10.03	16.66
FYR Macedonia	0.73	0.65	na
Georgia	2.93	0.11	na
Hungary	15.93	10.72	51.93
Kazakhstan	7.68	0.35	24.54
Kyrgyz Republic	0.52	1.07	58.14
Latvia	5.87	1.16	20.9
Lithuania	11.45	1.54	23.03
Moldova	14.5	2.05	24.53
Poland	8.93	3.82	71.8
Romania	3.21	0.6	38.45
Russia	16.79	5.48	21.07
Serbia and Mont.	2.01	0.62	na
Slovak Republic	7.09	4.69	102.94
Slovenia	11.08	2.81	23.31
Ukraine	5.4	0.44	8.6
Uzbekistan	0.83	0.24	108.73
Argentina	27.7	3.7	23.19
Brazil	25.65	11.59	42.49
EMU	44.56	36.2	103.16
Germany	36.04	36.42	134.25
Ireland	63.21	25.62	54.56
Korea, Rep.	41.9	74.1	168.67
Mexico	27.12	9.16	34.22
United Kingdom	131.69	70.42	64.16
United States	105.9	124.12	129.93

Note: All the numbers are averages of the available data for the period 1989 – 2003
Source: WDI Database

Table A1.6: Definitions and data sources of the variables included in the analysis

VARIABLE NAME	SOURCE	DEFINITION
Market capitalization to GDP	WDI database; based on Standard & Poor's *Emerging Stock Markets Factbook*	the share price times the number of shares outstanding (% of GDP)
Growth of value traded	WDI database; based on Standard & Poor's *Emerging Stock Markets Factbook*	value traded refers to the total value of shares traded during the period (% of GDP)
Turnover ratio	WDI database; based on Standard & Poor's *Emerging Stock Markets Factbook*	total value of shares traded during the period divided by the average market capitalization for the period
New capital raised	http://www.fibv.com	capital raised by all listed companies (% of market capitalization)
Mass privatization dummy variable	EBRD, taxonomy of mass privatization	dummy variable that equals one starting from the period when mass privatization was implemented as primary or secondary privatization method in a given country (value 0 before it started)

Table A1.7: The main descriptive statistics of stock market indicators used

Variable	Obs.	Country	Mean	St. Dev.	Min	Max
Market capitalization to GDP	195	23	9	9.9	0	53.2
Stocks traded to GDP	168	21	3.3	5.5	0	34.1
Turnover ratio	112	18	38.4	38.2	0.02	180
New capital raised	85	14	2 325	13 504	0	100 874

Source: The data set used for estimations, the author's calculations

Figure A1.1: Development of stock market indices in some transition economies
Czech Republic (index PX50) 1994 - 2006
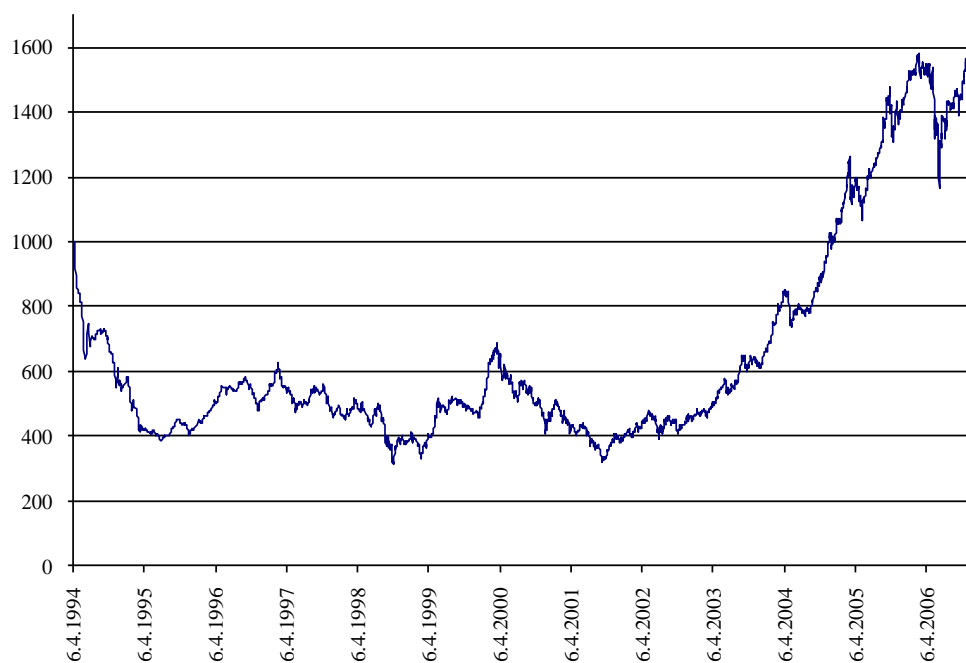
Source: Prague Stock Exchange

Slovak Republic (index SAX) 1993-2006
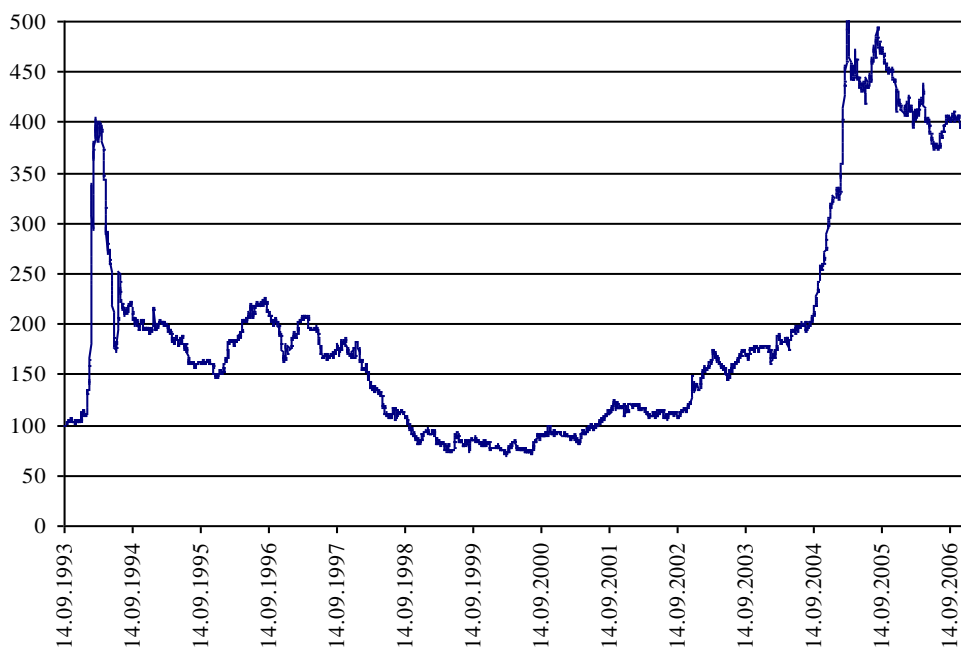
Source: Bloomberg and Bratislava Stock Exchange

Hungary (BUX index) 1991 - 2006

Source: Bloomberg

CHAPTER 2

CAN A WRONG ADMINISTRATIVE DECISION BE FIXED AGAIN? MASSIVE DELISTING ON THE PRAGUE STOCK EXCHANGE[33]

2.1 Introduction

Development of emerging stock markets has differed across transition countries. Some of the countries have followed a standard, so called "top-down", approach to stock market development characterized by gradual growth of market capitalization and the number of securities listed. A bottom-up approach, on the other hand, started with a large number of listed shares out of which only some have survived on the market (Simoneti, 1997). Thus, despite the expectations of growth in the number of listed securities as well as the amounts of trade, some stock markets in transition economies have, after the initial boom, experienced massive delisting, i.e. a large proportion of the listed share issues was excluded from public trading within a relatively short period of time. This massive delisting together with virtually no new listings pointed out problems in fulfilling the main functions of the stock market[34], which based on our conjecture, may have the roots in the way these markets were established.

The phenomenon of delisting is to certain extent a common occurrence in developed economies as well[35]. Nonetheless, the number of delisted share issues is

---

[34] For example they did not fulfill their information function, see Hanousek and Filer (2000) who show that prices were disconnected with reality. Unlike Poland and Hungary, the Czech stock prices did not correspond to economic values in the period 1993 – 1999.
[35] See for example Macey et al. (2004).

insignificant compared to the size of the market. According to the New York Stock Exchange (NYSE) Factbook 6% of NYSE companies were delisted in 1997[36]. In the same year, 75% of companies were delisted from the Prague Stock Exchange (PSE). When considering these amounts it is, however, necessary to account for the number of new listings as well. In this respect, transition economies in general fall behind the developed ones as there have only been several new listings and thus just a few companies entering the market through initial public offerings on the majority of these emerging stock markets (Köke and Schröder, 2002; Bakker and Gross, 2004).

Delisting from the transition markets can be viewed from several different perspectives. Firstly, it indicates that in some cases unsuitable companies were initially placed to the market. Here delisting undoubtedly benefited the market because these companies left the market and thus it became more transparent. On the other hand, delisting in transition economies could hurt small investors with minority holdings[37] because there were no exit rules defined at the time of delisting. Furthermore, massive delisting in conjunction with practically no new listings contributed to shrinking of the market, which then offered fewer investment opportunities and thus free resources had to be invested elsewhere, usually abroad.

This situation still concerns the Czech stock market where the number of liquid securities traded on the stock exchange is relatively low[38]. Despite high expectations, there have been no initial public offerings between June 2004[39] and December 2006 and

---

[36] The proportion of companies delisted from the NYSE within a year has not exceeded 10% in the period 1995 – 2002 (NYSE Factbook).

[37] As it was the case for example in Bulgaria. For more detail see Atanasov et al. (2005).

[38] In fact, liquid securities are only the ones that belong to SPAD (System for Support of Share and Bond Market). In 2006 there were 11 of them, at the end of 2008 the number was 14 (for more details see the Prague Stock Exchange webpage www.pse.cz). This number was low not only in comparison to other similar transition countries (e.g. Poland or Hungary, see Table A2.1 in the appendix) but also in comparison to countries with a similar level of GDP per capita (e.g. in Portugal there were around 50 shares listed on the main market or South Korea where there where more than 600 listed shares). For more details see Euronext Lisbon Fact book and the statistics of the World Federation of Exchanges.

[39] The first successful IPO of Zentiva took place in June 2004. Zentiva is traded in SPAD, it also became part of PX-50 index and the value of its shares has almost doubled since its entry. The PSE expected several potential followers of Zentiva in 2005, however two cases of only dual listing took place: Orco and Central European Media Enterprises and it seems that Zentiva's IPO did not inspire other companies. Two share issues (ECM Real Estate Investments A.G. and Pegas Nonwovens SA) have however entered the stock exchange in December 2006.

investors therefore invest their free resources also abroad. This way they in fact indirectly finance growth of the foreign economies while growth of the Czech economy can be hindered[40]. On the other hand, there was a growing trend in the number of listed securities since the beginning of trading on the Warsaw and Budapest Stock Exchange (see Table A2.1 in the appendix). These markets are still attracting new companies, which come also from abroad. Thus, unlike the Czech market, they have already managed to provide capital to the corporate sector, especially through IPOs.

Taking into account the implemented institutional and other reforms, we suspect that differences in the development of the Czech and Slovak market on one hand and the Polish or Hungarian stock market on the other, have been the result of policies applied in the early stages of the transition process; most importantly privatization which, based on Korhonen et al. (2000), lays the foundation for the development of securities markets. In Poland and Hungary the primary privatization method was direct sales, while in the Czech Republic it was voucher privatization[41], which even nowadays remains the subject of much discussion and controversy (Megginson, 2005). This method, as the analysis in the first chapter suggests, has exhibited a negative short run impact on the emerging stock markets in transition countries.

Czech voucher privatization can therefore be regarded as an experiment which allows us to investigate under what conditions a viable stock market arises. In this paper we analyze this by employing firm-level data. Using the data on listed and delisted companies we show that it was possible to prevent massive delisting if certain pre-privatization and privatization characteristics of the companies had been taken into account when deciding which companies to place on the stock exchange for public trading following the voucher privatization.

The following section provides detailed description of the stock market emergence and the delisting process on the Prague Stock Exchange. Section 2.3 examines determinants of delisting. In sections 2.4 and 2.5 we discuss specifications of estimated

---

[40] Analysts estimate that this way the Czech economy could lose as much as 1.5% of its growth (Ekonom 3/2005).

[41] Primary privatization based on the classification in the EBRD Transition Reports.

models and the data used. Then, results, their interpretation and robustness follow in section 2.6. Section 2.7 concludes.

2.2 Privatization and stock market development in the Czech Republic

The Prague Stock Exchange (PSE) started trading in the early 1990's as one of the first stock exchanges in the transition countries[42]. Its establishment and further functioning was closely related to voucher privatization, which was implemented in two waves. This privatization method was selected because it enabled relatively fast transformation of ownership rights. Furthermore, voucher privatization, at the time when it was implemented, was considered to be rather simple, equitable and transparent and thus also socially and politically acceptable (World Bank, 2002). Any possible drawbacks were regarded as temporary, with the market expected to be strong enough to solve them and enable necessary ownership concentration (Ježek, 1997)[43]. Unfortunately, such expectations did not materialize. Voucher privatization failed to concentrate companies' ownership structure, minority shareholders' rights were harmed, foreign investors were not attracted and new capital necessary for companies' restructuring was not generated (Lieberman, 1997).

Moreover, voucher privatization incurred certain "hidden" costs that were not recognized at the beginning and only became obvious during or even after its implementation. These costs concern the evolution of necessary market institutions of the type that function in the developed market economies[44]. The stock market is undoubtedly one of them. It was considered to be an important means of enabling the transfer of ownership rights, the main goal of privatization (World Development Report 1996). Thus the stock market was formally set up at the beginning of the 1990s, following the end of the first wave of voucher privatization. Under this privatization scheme shares of all privatized companies were legally required to be mandatory listed on the stock

---

[42] In fact the Prague Stock Exchange was reopened in the early 1990s because the trading in securities existed there even before the WWI.

[43] Ježek (1997) describes the situation after privatization when capital market was not regulated at all as false liberalism.

[44] "Czech officials deem it more important to privatize state property quickly than to settle in advance the details of a market economy," (The Economist, 1993)

exchange[45] (PSE Monthly Report, May 1997). Even though listing requirements[46] for companies desiring to enter the market were formally defined by 1993, privatized enterprises were not subject to them. This is not a standard approach towards stock market creation because privatization authorities not companies themselves were the ones to decide on listed companies. Although the managers in the privatized companies

prepared the privatization plans themselves and chose to participate in the voucher privatization program[47], later evidence from the stock exchange indicates that they did not know that this privatization method was connected to the mandatory listing of their shares[48]. Moreover, at the time of submission of their privatization projects to the responsible ministries, virtually no legislation concerning the stock market and its functioning was in force[49].

The above description suggests that the approach to market creation adopted in the Czech Republic was a pure administrative decision that ignored the usual listing requirements and suppressed the traditional concept of stock market development. Consequently, companies that under standard conditions would prefer to be privately owned ended up being public right after the PSE was opened. The PSE started trading on April 6, 1993 and by June 22, 1993 622 share issues from the first wave of voucher privatization were being traded there. Just a few weeks later, on July 13, 1993, the rest of

---

[45] Even though the listing was mandatory, not all the privatized companies appeared on the stock exchange. In the first wave 988 companies were privatized, however, only 955 share issues were listed on the stock exchange. Unfortunately, even the stock exchange authorities cannot explain this difference. Following the second wave there were 674 share issues listed and three issues were not listed because of their limited transferability. However, altogether 861 enterprises participated in the second privatization wave.

[46] Listing requirements at that time concerned the volume of an issue earmarked for public offer (min. 100 mil.CZK i.e. 3.4 mil. USD), percentage of an issue realized through public offer (min. 20% of the total volume of an issue) and the length of issuer's existence (min. 2 years). In fact, a lot of companies that were placed on the stock exchange after privatization did not satisfy these requirements.

[47] This was envisaged already before the actual privatization started: "Most companies will join, either voluntarily or on the orders of the government, a give-away scheme based on investment vouchers." (The Economist, 1991). Moreover, Kotrba (1995) suggests that authorities "recommended" voucher privatization to be the most suitable method.

[48] PSE Monthly Report (May 1997) mentions that some issuers were surprised when they were told about their stocks being listed on the stock exchange. This is in line with a general view that many mass privatization programs were slow to recognize the natural link between privatization and development of capital market (Lieberman, 1997).

[49] Companies were obliged to submit their privatization projects by October 31, 1991 for the first privatization round and by July 16, 1992 for the second round. A commercial code was enacted on November 5, 1991 and a securities law on November 20, 1992. This indicates that even the policymakers were not fully aware of the connection between mass privatization and the stock exchange at the beginning.

the share issues (333) from the first wave entered the market. The number of securities grew further following the second wave of voucher privatization, when the market was "filled" with the new issues for the third time (PSE Monthly Report, May 1997). Then, 674 share issues from the second wave were introduced on March 1, 1995. Continuing the trend of a growing number of issues, the highest number of security issues ever registered on the exchange (a total of 1,792) was achieved on May 2, 1996. Market capitalization to GDP reached 31.3% in 1996, which was much higher than in any other transition economy. Similar figures at that moment were 11.66% in Hungary, 6.42% in Poland and 9.5% in Russia (EBRD Transition report). This number is comparable to the market capitalization figures in developed economies, however, when adjusted for the size of public sector and investment fund holdings, the actual market capitalization in 1997 was 13.7% (Czech Republic: Capital Market Review, 1999)[50].

Hence, in line with Rozlucki (2001), voucher privatization to a large extent influenced the development of stock markets. Table A2.2 in the appendix shows that voucher privatization in the Czech Republic was followed by lively trading. This was basically the result of a liberal regulatory framework and a multiplicity of trading channels (Czech Republic: Capital Market Review, 1999). Speculators were trying to take advantage of the stock market boom in the early 1994. Afterwards emerging market funds from abroad entered the market. However, due to the condition prevailing at the market, they have left it relatively soon, generally by the fall 1996 (PSE Monthly Report, February 1997). Accordingly, as the PSE report further stresses, "the true foreign portfolio investors have not entered the market and domestic investors did not particularly care to invest in the securities either". Furthermore, the new market was rather nontransparent. This was not only due to a large number of listed securities but also because most of the transactions were conducted off the main market. In 1996 and 1997 as much as 88.5% and 91.1% respectively of all trades at the PSE were conducted as

---

[50] State holdings were deducted as they were not traded in reality. The value of investment funds holdings was also deducted because the value of their shares was added to the value of securities in which they were invested, thus they were double counted. Then, as the funds' own shares were valued at an average discount of about 40 percent relative to the portfolio value of the shares in which they were invested, this market value of investment funds shares was added. For more detail see: Czech Republic: Capital Market Review, 1999).

direct and block trade (Hanousek and Podpiera, 2004). Therefore the price-setting central market on the PSE remained relatively insignificant and the prices did not carry the true information. Then, after the foreign investors left and ownership structures consolidated, the main indicators of the Czech stock market functioning started to worsen (see Table A2.2 in the appendix). This fact is not only reflected in the development of prices and liquidity[51] but also in a sharp decrease in the number of listed securities since an exceptionally large number of securities were delisted[52] within a relatively short period of time (see Figure A2.1 in the appendix).

2.2.1 Delisting process

PSE authorities were trying to improve the market's situation. To make the market more transparent and provide a better arrangement for the trading of hundreds of securities, a segmentation of the market was introduced in September 1995. The listed market was split into main and secondary markets, and the formerly unlisted securities were transformed into the free market. The securities on the main and secondary market had to fulfill certain requirements[53] (certain minimal public offer, liquidity criteria, providing economic information about the company) while the free market did not impose any obligations on the securities. A large number of unlisted securities did not meet criteria of the public market (PSE Monthly Report, May 1997). Therefore, the PSE authorities decided to reduce the number of the security issues traded and delist, i.e. exclude from public trading, issues that did not conform to the current requirements of the market. The PSE authorities also took into account the sensitive nature of such a decision, especially with respect to the significant part of the Czech population that took part in the voucher privatization. In this respect "the decision concerning delisting could not be commenced too early and 1997 seemed to be sufficiently far from the end of voucher privatization" (PSE Monthly Report, May 1997).

---

[51] Even though standard turnover figures were relatively high, they were misleading especially due to multiple counting of transactions (which were the result of the structure of the market) and the associated dealing practices (for more detail see Czech Republic: Capital Market Review, 1999).

[52] Exceptionally large number when considered as a percentage of companies listed on certain stock exchange.

[53] For more detailed description see the Prague Stock Exchange Factbook 1996.

The process of delisting started at the end of 1996 (in December a trial round of 12 securities were delisted) when stock exchange employees even discussed this issue personally with all the affected issuers[54]. Until that time only an insignificant number of securities was delisted from the PSE. The reasons for delisting were mostly bankruptcy and limited transferability of the securities i.e. the delisting decision was not made by the PSE authorities. In 1997, however, the PSE began to play an important role in the delisting process. The PSE (Monthly Report, May 1997) cites the following factors to be crucial for the delisting decision:

- time of registration on the PSE (at least one year)
- value of trades on the central market
- value and frequency of direct and block trades
- market capitalization of the issue
- number of trading sessions with a non-zero value of trades on the central market
- ownership structure
- voluntary disclosure of the information on the issuer and the issue
- possible interests of the National Property Fund

There were four major waves of massive delisting in 1997 taking place on March 20th, April 1st, June 2nd, and October 1st. Altogether 1301 issues were excluded from trading55. For each of these delisting waves certain criteria for delisting were set. They are listed in the following Table 2.1.

A majority of listed companies were delisted in 1997. In the first wave 100 free market issues were delisted, in the second 391 issues, the third one concerned 509 share issues and the last one included 301 issues. In the first three waves for each delisted security a combination of two of the above mentioned three requirements for the period of the preceding twelve months had to be met, value and capitalization or value and the

---

[54] Based on the PSE Monthly Report (May 1997), some issuers were surprised when they were told that their stocks were registered on the exchange, other issuers welcomed their delisting almost enthusiastically.
[55] Delisted share issues were afterwards listed on the RM-system (OTC market). Most of the delisted issues were delisted from RM-system as well, majority of them later than one year after delisting from PSE. Nowadays, only 3% of the issues delisted from PSE in 1997 are still traded on the RM-system.

number of trading sessions[56]. For the fourth wave of delisting both the condition concerning minimal traded value as well as the number of days when an issue was traded on the central market had to be fulfilled. The period under consideration was again the preceding twelve months.

Table 2.1: Delisting criteria set by the PSE
(all of them concern the period of the preceding 12 months)

CRITERION	1st and 2nd wave	3rd wave	4th wave
Traded value in the preceding 12 months less than	USD 6,300	USD 18,900	USD 47,300
Market capitalization less than	USD 157,000	USD 631,000	
Number of days when security was traded on the central market	less than 5	less than 80	less than 200
Displaced issues	100; 391	509	301

Source: Prague Stock Exchange, author's calculations (based on the yearly average exchange rate reported by the Czech National Bank)

Figures in this table show that the delisted companies were very small ones that would normally not be placed on a stock exchange under standard listing conditions. They were a fraction of the size of companies that were entering other transition markets at that time (e.g. an IPO that took place on the Budapest Stock Exchange in 1997 had the value of USD 4.477 mil.). Moreover, they even did not fulfill the official listing requirements at the PSE valid in 1997[57].

Afterwards, in 1998 only an insignificant number of securities was delisted, most of them because of the issuer's decision. In 1999, 75 issues were excluded from the free market on September 20th. They were already excluded from the pricing central market on February 15, 1999 due to low liquidity. This decision was meant to further contribute to increasing the transparency of the market. The amended Security Act, which entered

---

[56] The PSE claims that except for the above mentioned conditions also other issues were accounted for when deciding about delisting: value and frequency of direct and block trades, the structure of the company owners, providing information about the issuer and the security issue to the stock exchange and trading conducted at the international stock exchanges. Even though these criteria are mentioned by the PSE, it does not explain how they were taken into account.

[57] Volume of the part of the issue released through public offer had to be at least USD 3.4 mil. and proportion of the issue released through public offer in the total volume of the issue at least 20%. In addition the issuer had to be in business for at least two years (PSE Monthly Report, February 1997).

into force on May 1, tightened the conditions for admitting and keeping securities in public markets[58] and thus contributed to yet further delisting. However, the number of additional companies was low. Together there were 34 share issues delisted in 2001. Further, in 2002 and 2003 only 14 and 10 issues, respectively, were delisted, followed by another 10 issues in 2004. This trend continued in 2005 and 2006 when 16 and 9 companies, respectively, were delisted, all of them based on the issuer's decision. Figure A2.1 in the appendix and the following Table 2.2 provide a more comprehensive picture of delisting on the PSE.

Table 2.2: Reasons for delisting firms from the Prague Stock Exchange in 1993 – 2006

reason/year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
decision of the authority			*1*	*11*	*1210*	*1*	*65*	*4*	*13*	*7*	*2*			
PSE														
Ministry of Finance			1											
decision not specified														
sanction of the PSE board				1				1	1					
trading group cancelled							65							
insufficient liquidity				10	1210			1						
low liquidity and high own. concentration										5				
low marcap and liquidity									9	2	2			
low marcap, liquidity and high own. conc.									3					
information duties						1		2						
decision of the issuer	*6*	*7*	*12*	*37*	*10*	*6*	*11*	*14*	*17*	*5*	*8*	*10*	*16*	*9*
issuer's request		2	4	1	2			1	2	2	5	10	9	3
end of public trading	2		3	29	7	6	11	13	15	3	3			
limited transferability	4	5	5	7	1									
squeeze out													7	6
bancruptcy related	*3*	*3*	*6*	*13*	*5*	*4*	*3*	*10*	*4*	*2*				
start of chapter 7 or 11		1		7	3	2	2	2	1	1				
start of liquidation				1				1	1					
liquidation	3	2	6	5	2	2	1	7	2	1				
Total delisted	**9**	**10**	**19**	**61**	**1225**	**11**	**79**	**28**	**34**	**14**	**10**	**10**	**16**	**9**
Delisted (% of listed at the beginning of year)		1	1.9	3.6	73.4	3.4	26	14.4	22.5	13.7	12.7	15.4	29.1	

Source: Prague Stock Exchange and author's calculations

---

[58] Admission to the main and secondary market required the issuer to be in the business for a minimum of three years (before it was only two years). The disclosure duties on the free market were expanded.

Figures in this table confirm that massive delisting took place on the PSE especially in 1997 when almost 80% of all delisted companies left the market, most of them due to insufficient liquidity. Such a sharp decline in the number of traded shares in conjunction with almost no new companies entering the market did not contribute to the desired development of the newly created market. This leads us to the investigation of the effects and determinants of delisting in transition economies which is lacking in the relevant literature. Our research thus helps answer the question if and how it had been possible to prevent this situation and this way ensure a more standard development of the emerging stock market. In more general terms we are interested to investigate under what circumstances a viable market for shares arises.

2.3 Determinants of delisting

Based on the above description of stock market development in the Czech Republic, we assume that there exist certain indicators according to which it would have been possible to predict delisting. Delisting indicates an effort of the market mechanism to remedy the wrong decision of privatization authorities as most of the enterprises excluded from public market were not natural candidates for public trading. Privatization is therefore the most important criterion when identifying the determinants of delisting in the Czech Republic. This approach sheds light on the structure of factors that played an important role in the delisting process and also indicates that certain determinants were decisive from the very beginning i.e. it was possible to account for them even in the pre-privatization period. Factors connected to privatization are important because they are connected to the concentration of ownership. If the pre-privatization and privatization determinants turn out significant, it could point out that the decision to place all the privatized companies to the stock exchange when the stock market was not functioning yet and could not bear such a high number of securities, was not the best one from the point of view of stock market development. In this respect emerging market did not necessarily have to be strong enough to deal with this situation as the authorities were stressing. Even in the case of important financial centres the government played essential

role in kick-starting financial development since laissez-faire approach and secured property rights alone were not sufficient (Andrianova et al., 2008).

Based on the above discussion, we consider delisting to be a function of the following three groups of factors:

$$delisting = f(pre\_priv, \ priv, \ post\_priv) \qquad (2.1)$$

The first group covers pre-privatization characteristics (pre_priv) of the companies, the second is related to the privatization process (priv) and the third one concerns post-privatization (post_priv) factors[59].

- PRE-PRIVATIZATION FACTORS

These factors contain general characteristics of companies prior to privatization. They include the industry to which a given company belongs[60], the size of the company as well as indicators of its financial "health". We measure the size of the company by the number of employees and also the total number of the company's shares[61]. Larger companies are expected to be less prone to delisting as their size makes them more natural candidates for public trading. Moreover, it should be much harder to obtain a controlling share in a big company. For financial indicators we have available the indicators of sales, profit and debt scaled by the company's capital. These are available for the three years before the privatization took place. However, all of these indicators are based on socialist accounting practices which do not necessary provide a true picture of a company's situation. This will be taken into account when discussing the results of our estimations.

- PRIVATIZATION FACTORS

This set of delisting determinants relates to the privatization process and its aftermath. We distinguish two privatization waves while also taking into account the companies that were privatized in both of these waves. An important source of information is the privatization project that was prepared by the managers of each company before the actual privatization took place and that was finally accepted. Here the expected ownership

---

[59] This qualification of determinants is based on the timing of information and therefore we do not consider interactions between these factors.

[60] We use PSE classification.

[61] Equal to company's book value since the nominal value of original shares was 1000 CZK.

structure was indicated and we use the data concerning shares of the company owned by the National Property Fund (NPF). A higher ownership share of the NPF indicates the interest of state in a given company. The reasons leading to this decision ranged from the intention of the state to implement necessary structural changes in a given company to preventing the company from misusing its monopoly position (NPF Annual Report 1995). As the objective of the NPF was to show how well stock market works and thus keep its companies publicly tradable, the probability of delisting in these cases can be considered rather low.

The attractiveness of certain companies in the privatization process is reflected in the average price for which the shares were sold in the auctions. Companies with a better future outlook and thus with a lower probability of being delisted should be characterized by a relatively higher average price of their shares. Different proportions of companies' assets were offered in mass privatization, a factor that is reflected by the ratio of the number of shares in mass privatization to total number of shares. The ownership structure that arises right after the privatization is crucial for further development of the company. The proportion owned by individuals as well as investment privatization funds is expected to play a role here.

- POST-PRIVATIZATION FACTORS

We first consider the development of the financial indicators after privatization and the consolidation of the ownership structure as these could reveal companies that would most likely be delisted. The indicators that are investigated include sales, profit, operational profit, total liabilities and value added, all scaled by total assets. Moreover, the sales variable is used to calculate growth opportunities for a company, defined as the growth rate between the current and following year of average sales in a given industry, excluding the company itself. The same calculation is applied to the operational profit data to obtain potential profit figure.

Further, trading on the stock exchange could also be taken into account. One of the main trading characteristic is the frequency of trading of the stock. Even if this indicator is low, it does not have to lead to delisting on the developed market because it only indicates that the distribution of beliefs is the same among traders. In the Czech case,

however, a low frequency of trading was one of the conditions for delisting set by the PSE. On the other hand, a high frequency of trading can be considered a good signal, particularly if this trend persists over time. An irregular pattern of trading intensity can indicate either a consolidation of ownership structure following mass privatization or an attempt to influence the price and consequently a potential tender offer price for minority shareholders (Atanasov et al., 2005). In this respect the development of price and price differentials can help clarify the situation. Another feature of trading is trading in blocks. If there are many block trades that significantly influence the price, there is a probability of price manipulation leading to tunneling and further delisting. Nevertheless, the usage of trading characteristics as determinants of delisting can cause difficulties in the estimations because of the possible endogeneity problem. This problem arises if we assume that market is functioning properly in a sense that it already takes into account the fact that some of the privatized companies should not be listed on the stock exchange. If this assumption holds, the fact that the frequency of their trading is low just indicates that market expects these companies to be delisted and thus endogeneity problem is present. Nonetheless, we will estimate the model in a reduced equation form in which simultaneous effects will not be taken into account. Therefore we will consider only the determinants of delisting that do not concern trading on the stock exchange.

In comparison to our previous discussion, the official reasons for delisting provided by the responsible authorities are defined rather broadly[62]. Table 2.2 in section 2.2 provides them in more detail. It shows that the most important reasons for excluding firms from public trading in the Czech Republic are based on the decision of the authorities, mostly the PSE. The most commonly mentioned reason is insufficient liquidity of securities (about 80% of delisted securities). Then, the end of public trading based on the decision of the issuer follows (about 6% of delisted companies) and more than 4% of companies were delisted in 1999 when their trading group on the PSE was cancelled. The number of companies delisted due to other reasons is insignificant when

---

[62] In this respect it is important to note that the time of delisting also plays a role here. The later certain security was delisted, the more precisely the reasons for its delisting were defined. In fact, in 1997 when the highest number of firms was delisted the appropriate reasoning was not provided for all the delisted companies.

we consider them in relation to all 1510 delisted companies. It is thus clear that the reasons for delisting provided by the PSE are not sufficient in order to explain the phenomenon of delisting and a more careful investigation is necessary.

2.4 Methodology

Delisting is modelled as a zero-one phenomenon, i.e. the company is still traded on the stock exchange (0) or it is delisted (1). We estimate a linear probability model where the dependent variable is the probability of delisting. It equals one for the companies that were delisted. The explanatory variables belong to the three groups of factors described in the previous section (equation 2.1) and thus the estimated model has the following form:

$$P(y_i = 1) = \alpha + \beta \cdot pre\_priv_i + \gamma \cdot priv_i + \delta \cdot post\_priv_i \qquad (2.2)$$

We also take into account possible connections between variables in different groups. It has already been mentioned that the average share price in a privatization auction reflects the attractiveness of a given company for investors. Thus, if we assume that market functions well and the future prospects of a company are already included in this price, the post-privatization profit variable could be connected to the average price. This could lead to an endogeneity problem and spoil our results. To account for this problem, we use the growth in sales and the growth in operational profit instead of plain operational profits and sales as indicators of the post-privatization development. Both of them are defined as the growth rate between the current and the following year of average value in a given industry, excluding the company itself. As the company under consideration is not included in the construction of these indicators, we consider their usage appropriate to solve possible endogeneity problem. Furthermore, these indicators are suitable to describe the post-privatization development. Growth in sales accounts for the opportunities the company has in its own industry and operational profit variable shows the profitability i.e. resources available inside the companies. The actual model that we finally run on the whole data sample has the following specification:

$$P(del_i = 1) = \alpha + \beta_1 \cdot tns_i + \beta_2 \cdot npf_i + \beta_3 \cdot prof\_tns_i + \gamma_1 \cdot ap_i + \gamma_2 \cdot ap_i^2 +$$
$$+ \gamma_3 \cdot wave_i + \gamma_4 \cdot both_i + \delta_1 \cdot opro\_gr_i + \delta_2 \cdot sales\_gr_i + \delta_3 \cdot mills_i \qquad (2.3)$$

where

- *del* is a dummy variable that equals 1 for company that was delisted before the end of 2006 and 0 for not-delisted

- *tns* is total number of shares of a company (in millions of shares)

- *npf* is the share of company owned by the National Property Fund that was indicated in the company's privatization project

- *prof_tns* is profit per share one year before privatization

- *ap* is average price of company's shares in the privatization auction (in points)

- *wave* stands for a dummy variable which equals one if the company was privatized in the first privatization wave

- *both* is a dummy variable that equals one for companies privatized in both waves

- *opro_gr* is growth in operational profit defined as the growth rate of average operational profit in the industry (between 1996 and 1997), excluding the company itself

- *sales_gr* stands for growth opportunities, defined as the growth rate of average sales in the industry (between 1996 and 1997), excluding the company itself

- *mills* is the inverse Mills ratio[63]

This inverse Mills ratio enables us to account for the missing financial data problem. Even though our sample contains all the companies privatized under the voucher privatization scheme, we face the problem of missing observations, due to the fact that not all the companies were willing to report their financial results. This was possible because market supervision as well as law enforcement after privatization were weak. The presence of missing observations leads to a sample selection bias problem that we address by employing a two stage estimation (Heckman, 1979). The main part of this estimation constitutes the linear probability model described above. In order to obtain the

---

[63] It is the ratio of the probability density function for the standard normal over its cumulative density function.

inverse Mills ratio for this model we investigate the firms that do not report information about their profits before and after the privatization and consider the factors determining their decision. This approach is a Heckit regression where we employ probit estimation in the first stage and a linear probability model in the second. We have chosen linear probability model for several reasons. Firstly, it allows to instrument for profit and in comparison to logit it provides consistent estimates under standard assumptions (Angrist and Krueger, 2001). Moreover, the linear probability model can be corrected for sample selection.

The probit regression, with the dependent variable being missing financial data as a binary response, that we estimate first has the following form:

$$P(sel_i = 1) = const + \alpha \cdot size_i + \beta \cdot owner_i + \gamma \cdot ipf_i + \delta \cdot ind_i + \omega \cdot miss_i \qquad (2.4)$$

where *size* accounts for the size of the company[64] and its proportion privatized in the voucher privatization. The set of variables concerning the ownership structure (*owner*) described in the privatization project includes dummy variables for domestic and foreign owners as well as restitutions, National Property Fund share, municipalities and selling via intermediaries. *IPF* stands for the actual ownership shares owned by the investment privatization funds following the privatization. We further account for the industry to which a given company belongs (*ind*)[65]. Moreover, we define a dummy variable based on the firm's reporting or non-reporting in the pre-privatization period (*miss*). If a company has not reported some of its financial indicators before[66], we believe that there is a high probability that it will continue doing so also after privatization.

Except for this basic two stage model where we only distinguish between delisted and not delisted share issues, we also employ a more precise classification of companies. It concerns the three main reasons for delisting: decision of the authority, decision of the issuer and bankruptcy related reasons. The determinants of delisting may be different for each of these subgroups. The results of preliminary investigation confirm that the

---

[64] We also add quadratic term to this variable, since we expect the relationship to be nonlinear.
[65] We use PSE classification.
[66] At least two out of the three pre-privatization indicators are missing in our sample.

proportions of missing observations are not significantly different when accounting for different delisting reasons (see Table A2.8 in the appendix) and therefore there is no need to estimate the model in two stages as the one above where we only distinguished between delisted and not delisted companies. Rather, we run multinomial logit estimation based on a similar model specification as before (equation 2.3), where the dependent variable takes four different values. They account for not delisted firms, firms delisted due to decision of the authority, issuer and bankruptcy respectively.

Besides binary regression model, another possibility to estimate delisting is survival analysis employing a hazard model. The dependent variable in this case is time elapsed until a given company becomes delisted. The fact that delisting in most cases occurred in the waves can however cause problems with identification of such a model. The actual date of delisting is not that important for this analysis and moreover, it may even be affected by other factors of a mainly technical and administrative nature. Therefore, we prefer to conduct the analysis by using several variations of binary regression model instead.

2.5 Data description

Our data set includes the population of firms privatized in the first and the second wave of the voucher privatization program. Altogether it contains 1664 medium and large non-financial companies that traded on the Prague Stock Exchange following privatization. Data concerning privatization come from the Ministry of Privatization of the Czech Republic as well as the Ministry of Finance (privatization projects, pre-privatization data). They concern the period 1992 – 1995. The data on holdings after the first and second privatization wave come from the Prague Securities Centre database. Financial data, together with the post-privatization ownership structure of the companies are from the private database ASPEKT[67] which is based on the annual reports as well as information provided to the stock exchange and companies' shareholders. Here, the time period of interest are years 1995 – 1997 i.e. after privatization and before the major

---

[67] ASPEKT database is a Czech source for AMADEUS, a pan-European database containing financial statements data. All financial statements in our data set are audited.

delisting. Finally, the Prague Stock Exchange provided data about delisting for 1993 - 2006. Details concerning changes in the legal status of delisted companies (bankruptcy, merger, acquisition) were taken from the Czech companies register[68]. Description of the variables used in the estimation is provided in the appendix (Table A2.9 in the appendix).

2.5.1 Descriptive statistics

Different characteristics of the companies are investigated for the whole sample as well as for the subcategories of delisted and not delisted companies. Differences between these subsamples are tested using nonparametric tests[69]. Furthermore, in the delisted subgroup we distinguish the waves of delisting as well as the different reasons for which the companies were delisted. Descriptive statistics show that the data for all the companies and subgroups included in analysis are characterized by a very high degree of variability. This pattern is especially visible when considering median and quartile coefficients[70].

Pre-privatization firm size is measured by the number of employees as well as the total number of firm's shares in the voucher privatization (see Table A2.3 in the appendix). The absolute number of employees decreases for both delisted and not delisted subgroups with approaching privatization. This decrease is more significant for the delisted companies and within this subgroup especially for companies that were delisted due to bankruptcy. The general decrease in the number of employees before privatization can be attributed to the overall transition process and restructuring, which was taking place at the beginning of the 1990s. The difference between the number of employees three years and one year before privatization shows the dynamics of the ongoing restructuring. Analysis of the number of employees variable, however, faces a problem of missing observations, with the number of observations three years before privatization much lower in comparison to what is available for one year before privatization. Furthermore, the data concerning the number of employees for the firms included in our sample is not available for the period after privatization. Therefore, we focus on the total

---

[68] www.justice.cz. By further existence we mean existence of the company's capital. Therefore if a company merged with some other company, its capital is still in use and we consider this acceptable for our purposes.
[69] We use nonparametric K-sample test on the equality of medians and the Wilcoxon ranksum test. We do not provide the exact outcomes of these tests here but they are available upon request.
[70] Detailed results are not part of this paper but are available at http://home.cerge-ei.cz/fungacova.

number of shares which reflects the capital or "book value" of a given company as our size measure. Moreover, thanks to this pre-privatization measure we can use total assets variable for the after privatization period because it basically measures the same thing as the total number of shares variable.

The total number of shares indicator, similar to the number of employees variable, shows that delisted companies are significantly[71] smaller than their counterparts that remain listed on the stock exchange. Companies delisted based on the decision of the authority are smaller than companies delisted for other reasons. This result indicates the effort of the PSE to consolidate the situation on the stock exchange and correct the wrong administrative decision of placing all the privatization companies' shares on the public market. Moreover, companies delisted in the four main waves in 1997 and before are significantly smaller than the ones delisted afterwards. Results for the total number of shares variable thus confirm our expectation that the size of a company measured by the amount of company's capital is an important predictor of delisting, result found also for Bulgaria (Atanasov et al., 2005). This trend is confirmed by the distribution of companies listed on the PSE by size (Figure A2.2 in the appendix).

On the other hand, the pre-privatization financial characteristics (sales, debt, and profit) do not differ significantly for the subgroups of companies that we consider (see Table A2.4 in the appendix). This could be attributed to the fact that restructuring was only beginning in the early 1990s as there was no private ownership at that time. Consequently, its effect cannot yet be visible in the financial indicators. Another possible explanation is that this data is based on socialist accounting practices which were different from western standards, reflecting the amount of production rather than the profitability of the companies[72]. Nevertheless, the amount of debt increases for companies that are not delisted as the time of privatization approaches. This could indicate their effort to restructure. It is important to note, however, that the number of observations of debt available in our sample is lower than for the other financial indicators, meaning that not all the companies were willing to provide this information to the public. Similar to

---

[71] Nonparametric K-sample test on the equality of medians and the Wilcoxon ranksum tests mentioned above confirm these results.
[72] For more details see Filer and Hanousek (2002).

debt, the profit variable also worsens for all the companies as privatization draws nearer. Profit, especially, decreases one year before privatization starts. This trend can most probably be attributed to the overall transition process and the abrupt changes that were going on in the economy at that time. However, the difference between sales three years and one year prior to privatization shows a significant difference between subsequently delisted and not delisted companies. Even though sales tend to increase for both subgroups, the increase for companies that were not delisted was significantly higher.

The average price of shares in the privatization process (see Table A2.5 and Table A2.6 in the appendix) was significantly higher for companies that were not delisted (see also Figure A2.3 in the appendix), indicating that these companies were more attractive for investors. Within the delisted subgroup, the average price is higher for companies delisted after 1997. All of these findings show that bidders in the privatization process were able to distinguish between "good" and "bad" companies and evaluate future prospects of a given company. Companies delisted based on the decision of the issuer exhibit higher average price than those delisted for other reasons. The fact that despite a relatively high average price they were delisted may indicate that the owners themselves found out that there is no reason for having company shares publicly traded due to the company's size and other company characteristics. On the other hand, one could speculate that the delisting decision of owners may also indicate possible tunneling in a given company.

Furthermore, when distinguishing the wave in which a given company was privatized, a difference in average price between the delisted and not delisted subgroups is apparent. The average price is significantly higher for the companies that belong to the second wave. The difference between the first and second wave may be attributed to the fact that the investors might have already acquired experience while bidding in the first privatization round. Moreover, the stock exchange had already been established by the time of the second wave and was functioning as a kind of bridge between the real and the "fictive" i.e. voucher point price based on the socialist accounting standards.

The privatization factors that we consider also include variables describing the ownership structure that arose right after privatization. Investment privatization funds'

holdings differ significantly after the second privatization wave for all the subgroups of companies that we consider (see Table A2.7 in the appendix). Funds' holdings are higher for delisted companies, which indicates that there was a higher probability of funds' owners exercising their power over the companies. When accounting for time of delisting, the results indicate that funds' holdings in companies delisted in and before 1997 are higher in comparison to the rest of the delisted companies. The reason for the significant differences only in the second wave holdings could be the announcement that the second privatization wave was the last one which made investors who were really interested in some company obtain as many of its shares as possible.

The third group of indicators concerns the period after privatization. We consider the following post-privatization financial characteristics: profit, operational profit and its growth, sales and their growth, total assets, total liabilities and value added[73]. Similar to our expectations, the above described nonparametric tests that we apply confirm that these characteristics are significantly different for delisted and not-delisted companies, as well as for the reasons and time subgroups within the delisted group.

2.6 Estimation and results

In order to estimate the influence of different factors on delisting we run the above described two stage Heckit regression on the sample including all companies ever listed on the PSE. The linear probability model (equation 2.3) provides us with the results summarized in the following Table 2.3.

All the explanatory variables included in the model with the exception of the pre-privatization profit indicator are significant. Moreover, the estimated effects exhibit the expected signs. There are two possible explanations for the non-significance of the pre-privatization profit. The first one is connected to the fact already mentioned, the quality of the data from the pre-privatization period. The indicator of profit in this case does not reflect profit but production and therefore does not necessarily reveal the true picture of a situation in a given company. The other explanation is the possibility of tunneling.

---

[73] Similar to the previous cases detail results are not part of this paper but are available at http://home.cerge-ei.cz/fungacova.

Table 2.3: Linear probability model for delisting (y=1 for delisting)

	Linear probability model		Interpretation
Pre-privatization factors	Estimated coefficient	Standard Error	Overall effect (one st. deviation change)
Total number of shares (millions of shares)	-0.0226**	0.010	-4%
Profit before privatization (scaled by book value)	6.5E-06	0.0003	0.01%
Privatization factors	Estimated coefficient	Standard Error	
National property fund ownership	-0.003***	0.001	-4.26%
Average price in voucher auction (in points)	-0.001***	0.0003	-5.66%
Average price (squared)	1.1E-06***	2.5E-07	0.31%
Average price (overall effect)			-5.35%
Privatization wave	-0.055***	0.015	
Privatized in both waves	-0.057**	0.028	
Post-privatization factors	Estimated coefficient	Standard Error	
Operational profit growth	-0.0001***	3.9E-05	-2.65%
Growth opportunities (sales)	0.006 ***	0.001	4.31%
Mills ratio (sample selection)	0.353 ***	0.087	
Constant	0.885 ***	0.027	
Number of observations	1,470		
Adjusted R^2	0.148		

Note: The table contains estimation results for the linear probability model. We report estimated coefficients as well as their significance (* significant at 10%, ** significant at 5% and *** significant at 1%). In the linear probability model estimated coefficient correspond to the marginal effect.

The significance of other factors indicates that delisted companies exhibited, before and during the actual privatization, different characteristics from the companies that remained on the stock exchange. Especially the size of the company (measured by the total number of shares which corresponds to company's book value) and the ownership structure described in the privatization project have played a role here. These results confirm our expectations with larger companies having a lower probability of being delisted. A one standard deviation change in the size of company measured by total number of shares, decreases probability of delisting by 4 percent (the last column in the above Table 2.3). More specifically, this result says that the increase in the size of company by a million shares decreases the probability of delisting by 2.26 percent. The significance and magnitude of the results indicate that, as we have argued earlier, not all the companies privatized in voucher privatization were suitable candidates for immediate

placement on the stock exchange. Size of the company could have been considered one of the decisive factors for the necessary filtering to prevent the emergence of a non-transparent market.

In addition to company size, the proportion of shares held by the National Property Fund (NPF) could serve as a predictor of possible delisting. Our results show that an increase in the amount of shares owned by the NPF by one percent decreases the probability of delisting by 0.3 percent, which is in the one standard deviation change measure as much as 4.3 percent. This is because the state tends to play a special role in the ownership structure and in this case it also indicates the future intensions of state towards the privatized company[74]. Another important privatization factor is the average price of the privatized companies' shares. As we expect to find a nonlinear relationship between average price and delisting, average price is also included in quadratic form. A higher price indicates higher valuation of the company by bidders[75] and thus, greater expected future prospects and lower probability of being delisted. The results of our estimation support this hypothesis. An increase in the average price by ten voucher points decreases the probability of delisting by 1 percent. A one standard deviation increase in price decreases the probability by 5.35 percent. Thus, the average price in the voucher auction turns out to be one of the most important predictors of delisting.

Another decisive factor is the wave in which a given company was privatized. Our results suggest that the probability of delisting is 5.5 percent lower for companies that were privatized in the first privatization wave and 5.7 percent for those that were privatized in both waves. This result is in line with findings of Gupta et al. (2000) who provide evidence that more profitable firms were privatized first in the Czech Republic.

Massive delisting took place in 1997, and thus also post-privatization company characteristics are expected to influence delisting. We consider operational profit which is, in comparison to the pre-privatization profit, based on standard accounting practices and, unlike the overall profit variable, better reflects the real functioning of a given

---

[74] Most of the companies where state owned a significant proportion of shares were so called strategic companies.
[75] Hanousek and Filer (2001) show that prices of larger firms comprising the bulk of assets in the voucher privatization scheme rapidly incorporated all the public as well as private information.

company because it does not include extraordinary items. The years under consideration are 1996 and 1997; this time period directly follows privatization and at the same time precedes the main waves of delisting. As already mentioned, due to a possible connection between profit and the average price in the privatization auction we construct an operational profit growth variable based on the operational profit growth in a given industry. Its estimated coefficient is significant and its sign indicates that decrease of growth in operational profits by one percentage point increases the probability of delisting by 0.01 percent, which in the standard deviation change measure translates into 2.65 percent. This result corresponds to our expectations, even though the effect is not as strong as in the case of pre-privatization and privatization factors, which play key role in explaining delisting.

The estimated model also considers future prospects of a listed company. We include a forward looking indicator that accounts for company's growth opportunities. As described in the methodology section, it is based on the growth of sales in a given industry. Similar to our expectations, the estimated coefficient is significant. One would expect it to have a negative sign, so that probability of delisting would decrease with higher growth opportunities. It is however, positive, and one standard deviation increase in the growth opportunities constitutes a 4.3 percent increase in probability of delisting. This means that future prospects play a role in delisting but our result also suggests that the new owners can despite promising future exercise their power and tunnel the company.

The inverse Mills ratio turns out significant which suggests that the unwillingness to report financial results plays a role in the delisting process and the two stage estimation procedure is necessary. R^2 as a measure for goodness of fit is not very high, however, taking into account the structure of the model and a relatively high number of delisted companies we cannot expect it to be much higher. We employ McNemar-type of test suggested by Hanousek (2000) to compare our model to a naive estimator on the basis of their predictive accuracy. This can be interpreted as a test of the significance of the model. The quality of prediction summarized in Table A2.10 in the appendix and the corresponding high value of χ^2 confirm that our estimator highly dominates the naïve

estimator in terms of prediction accuracy[76]. Thus, the estimated model is significant and supports our hypothesis, that there exist several economic measures, especially from the pre-privatization and privatization period, based on which delisting of certain company could have been predicted and that could have been used when deciding which companies to place on the stock exchange for public trading after the voucher privatization.

2.6.1 Reasons for delisting

Besides distinguishing between delisted and not delisted companies, we also account for the delisting reasons. There are three main categories of reasons for delisting we distinguish based on the information from the PSE: decision of the authority, decision of the issuer and bankruptcy related reasons. We deem it important to examine the determinants of delisting for these categories and as explained in the methodology section we employ a multinomial logit model to do it. It has the form of the basic model (equation 2.3) without Mills ratio but the dependent variable is different in this case. It can take four different values:

- 0 for companies that were not delisted
- 1 for companies delisted based on the decision of the authority
- 2 for companies delisted on the issuer's request
- 3 for bankruptcy related delisting

The estimation results uncover differences between groups of companies delisted due to different reasons. As Table 2.4 shows, the most significant results are obtained for the subgroup delisted due to the decision of the authority. This result is most probably also due to the size of this subgroup, as it contains as many as 1200 observations (which comprise 82% of the whole sample). The results for companies delisted due to the decision of the authority are in line with the results obtained for the basic model. The marginal effects that are reported stress the importance of company size, which is the most influential determinant of delisting because the probability of delisting decreases by 30% when increasing the number of shares by one million. Nevertheless, unlike the basic

---

[76] Formally we reject the null hypothesis that the probability of correct prediction is the same for both models.

model, the coefficient for the National Property Fund (NPF) variable is insignificant here. This may indicate that the significance of the NPF variable in the basic model was primarily driven by the companies that were not delisted. However, now when we distinguish subgroups of companies in more detail, the effects across them differ and the NPF variable becomes significant even for smaller subgroups.

Table 2.4: Multinomial logit model based on different reasons for delisting

MULTINOMIAL LOGIT	Decision of the authority		Decision of the issuer		Bankruptcy related	
Pre-privatization factors	coefficient	dP/dX	coefficient	dP/dX	coefficient	dP/dX
Total number of shares (millions)	-2.345 ***	-0.296	0.003	0.127	0.046	0.05
Profit before privatization (scaled by book value)	-0.0031	0.001	-0.034	-0.002	-0.0005	0.0002
Privatization factors						
National property fund ownership	-0.003	0.002	-0.035 ***	-0.002	-0.022 *	-0.0004
Average price (in points)	-0.016 ***	-0.002	0.003	0.001	-0.007	0.0001
Average price (squared)	2.8E-05 **	5.9E-07	-1.2E-05	-2.0E-06	-0.0001	-3.0E-06
Average price (together)		-0.002		0.001		-0.0003
Privatization wave	-1.081 ***	-0.13	-0.118	0.049	0.111	0.026
Privatized in both waves	-0.695 **	-0.082	-0.325	0.012	0.584	0.033
Post-privatization factors						
Growth opportunities (sales)	0.053 ***	0.004	0.030	-0.001	0.0471 *	0.0002
Operational profit growth	-0.001 **	-0.0001	-0.0003	0.0001	-0.002 **	-3.2E-05
Constant	3.758 ***	0.491	0.041	-0.196	-1.051 *	-0.11
Number of observations	1,656					
Scaled R^2	0.245					

Note: The table contains estimation results for the multinomial logit model where reasons for delisting are taken into account. The results for not delisted companies are not reported (it is possible to count them based on these numbers as the sum of probabilities equals 1). We report estimated coefficients, their significance (* significant at 10%, ** significant at 5% and *** significant at 1%) as well as marginal effects (dP/dX) for the particular reasons for delisting.

Yet, the effect of a lower number of observations is visible on the significance of the other coefficients for companies delisted in the two other subgroups. When interpreting these results there is another issue that needs to be taken into account. Companies delisted based on the issuer's request can be of two types. The first one is represented by the companies that are objectively, especially due to their size or area in which they operate, not appropriate candidates for public trading and their owners decided to delist in order to correct the wrong administrative decision that followed

voucher privatization. On the other hand, there are companies that their owners wanted to delist because they did not want to disclose information about the company to the public. These two issues then contribute to splitting this subgroup containing a relatively low number of observations even more and consequently it is not possible to expect any significant results. Despite this fact, as we have already mentioned, the ownership share of the NPF plays a significant role in the decision of the issuer subgroup. Increase of the share owned by the NPF by one percentage point decreases the probability of delisting by 0.2 percent. This result only confirms that companies where NPF has an ownership share are not expected to be delisted, especially if the reason for delisting is the decision of the issuer. The strong position of the NPF is visible also in the subgroup delisted due to the bankruptcy, where the NPF ownership variable is significant as well but its effect is much smaller (0.04 percentage points). The most important variable for the bankruptcy related subgroup is the operational profit growth variable. This is exactly what one would expect, as operational profit is a crucial indicator of a company's functioning. Even though its effect is significant, it is not very high. Thus, despite the fact that not all the results in this specification turn out significant, there are visible trends that confirm differences between companies delisted due to different reasons that are in line with our expectations and previous estimations.

Defining reasons for delisting based on the information we have available is rather difficult and thus it is possible to view it from several different perspectives. In the estimations conducted above we were mostly considering the reasons provided by the stock exchange. The most common reason for delisting defined by the stock exchange was insufficient liquidity. Until now we have treated it as a decision of the authority. In the alternative classification we consider companies delisted because of the insufficient liquidity to be part of the group delisted due to the decision of the issuer. This is because insufficient liquidity indicates the presence of a dominant owner, who in case he does not want his company to be publicly traded in fact does not have to do anything. Since the free float is low, he is only waiting until the company is delisted because of insufficient liquidity. This further opens a discussion about delisting de facto and de jure. Delisting de jure is the official delisting reported by the stock exchange, while delisting de facto

concerns the real behavior of the issuers. When taking delisting de facto approach, delisting due to insufficient liquidity can be considered a decision of the issuer. As a part of sensitivity analysis, we consider an alternative division of companies based on the de facto delisting approach and run the multinomial logit model described above on the new subgroups. The estimation results correspond to the ones already reported. The most significant results are obtained for subgroup with the highest number of observations and the signs and magnitudes of the estimated coefficients are in line with the results of our basic model. The results for the subgroup of companies delisted due to bankruptcy, which stays the same as in the original division, remain basically unchanged. All of this thus reconfirms our previous results.

2.6.2 Robustness check

All of the above-described estimations have also been carried out on the subsample that includes companies that were delisted in 1997 in the four major waves as well as those that have survived 1997. The companies in this subsample are the most important ones from the point of view of delisting as this phenomenon was relatively rare and insignificant before 1997. The estimations on this subsample have shown the same pattern of results as were described for all the companies. In this way we have in fact used this subsample to check the robustness of our results.

Furthermore, we have also included industrial dummies in the linear probability model estimated as the second stage of Heckit regression. The industrial dummies were defined rather broadly and we only distinguish between heavy and light industries. Even when including these dummies, the estimated coefficients of other explanatory variables remained basically unchanged, which once again confirms robustness of our results.

2.7 Conclusion

In its short history the Czech stock market, unlike the Polish or Hungarian one, experienced massive delisting of shares and virtually no initial public offerings. Nevertheless, delisting in the Czech Republic was necessary due to the fact that all the privatized companies were simply placed on the market by the administrative decision

following the voucher privatization. Interestingly enough, except the Czech Republic, massive delisting was also observed in other transition countries[77] where the initial background was similar to the Czech one: voucher privatization. Massive delisting in conjunction with almost no new companies entering the market put off the development of these markets. Accordingly, all of them seem to lack behind the other transition countries, as shown in Chapter 1.

In this paper we investigate the determinants of delisting and point out that it was possible to prevent this situation. The results of our estimation indicate that there exist several factors based on which it was possible to identify companies that were going to be delisted even before the actual delisting took place. These characteristics include the size of the company, ownership share of the National Property Fund, average price of company shares in the privatization process, privatization wave as well as company's future prospects. Furthermore, company's non-reporting in the pre-privatization period plays a role in the delisting process as well. Most of these determinants of delisting are connected to the pre-privatization and privatization period. This indicates that it could have been possible to prevent delisting if these issues had been taken into account when deciding which companies to place on the stock exchange for public trading following the voucher privatization. Taking into account the overall development on the PSE we conjecture that massive delisting did not only serve to correct the wrong decision of the privatization authorities by "cleaning" the market of unsuitable shares but it also sent a signal concerning the functioning of the whole market. Cleaning itself had a positive effect in the long run because the market became more transparent. Nevertheless, in the short run delisting seems to have a negative effect on the price development and the size of the market.

This development suggests that governments making the important decisions concerning privatization programs and influencing emerging stock markets should be very careful when choosing which companies will be privatized using a particular method and based on which criteria these companies will be placed on the stock exchange. If a

---

[77]Even though the developments in transition countries differed, besides Czech Republic delisting took place in Bulgaria, Lithuania and Slovakia.

proper filtering of companies had been implemented in the Czech Republic before placing privatized companies on the stock exchange, a more transparent stock market fulfilling its main economic functions would have emerged after the privatization. This result can also be supported by comparing the Czech market to its counterparts in Poland and Hungary where the stock market evolved gradually and there was no massive delisting of shares. By taking into account their development one could speculate that massive delisting in the Czech Republic was one of the decisive factors causing the fact that there were virtually no new listings on the PSE. Then, with only a few liquid securities, there were not enough investment opportunities neither for foreign, nor for domestic investors. This is important especially with respect to the ongoing pension system reform because the pension funds are usually required to invest some portion of their portfolio on the local market. If there are no suitable share issues available, they may end up buying only government bonds and investing more abroad, meaning that their economy could be deprived of this capital and they will in fact be financing the growth of some other country. Such an unfavorable development may, based on recent empirical studies, have implications for the country's further economic growth.

REFERENCES

Andrianova S., Demetriades P., Xu Ch. (2008): "Political Economy Origins of Financial Markets in Europe and Asia," Discussion Papers in Economics 08/1, Department of Economics, University of Leicester.

Angrist J. D., Krueger A. B. (2001): "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments," *Journal of Economic Perspectives*, Volume 15(4): 69 – 85.

Atanasov V., Ciccotello Conrad S., Gyoshev Stanley B. (2005): "How Does Law Affect Finance? An Empirical Examination of Tunneling in an Emerging Market," William Davidson Institute Working Paper No.742.

Bakker M., Gross A. (2004), 'Development of Non-bank Financial Institutions and Capital Markets in European Union Accession Countries', World Bank Working Paper No. 28

Czech Republic: Capital Market Review (1999), The World Bank Washington, D.C.

EBRD (European Bank for Reconstruction and Development), 1995 – 2003: Transition Report.

Gupta N., Ham J., Švejnar J. (2000): "Priorities and Sequencing in Privatization: Theory and Evidence from the Czech Republic," William Davidson Institute Working Paper No. 323.

Hanousek J. (2000): "Testing of (non-nested) Choice Models via Accuracy of Prediction: A Non-Parametric Approach," *Central European Journal of Operations Research* 8: 259 – 264.

Hanousek J., Filer R. (2000): "The Relationship Between Economic Factors and Equity Markets in Central Europe," *Economics of Transition* 8(3): 623 -638.

Hanousek J., Filer R. (2001): "Informational Content of Prices Set Using Excess Demand: The Natural Experiment of Czech Voucher Privatization," *European Economic Review* 45: 1619 – 1646.

Hanousek J., Filer R. (2002): "Research Data from Transition Economies," *Journal of Economic Perspectives* 16(1): 225 – 240.

Hanousek J., Podpiera R. (2004): "Czech Experience with Market Maker Trading System," *Economic Systems* 28: 177-191.

Heckman, J. (1979): "Sample Selection Bias as a Specification Error," *Econometrica* 47, 153-161.

Ježek T. (1997): "Česká republika bude mať komisiu pre cenné papiere (The Czech Republic will have Security Exchange Commission)," BURZA 12/1997.

Korhonen I., Kuus T., Zirnask V. (2000): "Baltic Securities Markets," Bank of Finland Institute for Economies in Transition, Online, No.5.

Kotrba J. (1995): "Privatization Process in the Czech Republic: Players and Winners," pp. 159 – 198, in Švejnar J.: *The Czech Republic and Economic Transformation in Eastern Europe,* San Diego, London and Toronto: Harcourt Brace, Academic Press.

Köke J., Schröder M. (2002): "The Prospects of Capital Markets in Central and Eastern Europe," ZEW Discussion Paper No. 02-57.

Lieberman I. W. (1997): "Mass Privatization in Comparative Perspective," in Lieberman I., Stilpon N., Raj D. (eds), Between State and Market: Mass Privatization in Transition Economies, The World Bank and OECD.

Macey J., O'Hara M., Pompilio D. (2005): "Down and Out in the Stock Market: The Law and Finance of the Delisting Process," SSRN Electronic Journal, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=583401

Mašek F. (2005): "Ani rekordy vše neřeší (Records will not solve all the problems)," Ekonom 3/2005.

Megginson W. L. (2005): *The Financial Economics of Privatization,* New York: Oxford University Press.

Prague Stock Exchange Annual and Monthly Reports (1993 – 2005).

Rozlucki W. (2001): "Emerging Stock Markets in Central Europe: Where Do We Stand?" In Bokros L., Fleming A., Votava C.: *Financial Transition in Europe and Central Asia: Challenges of the New Decade*, The International Bank for Reconstruction and Development / The World Bank.

Simoneti M. (1997), "Regulating Post-privatization Securities Markets in Transition Economies," in Lieberman I., Stilpon N., Raj D. (eds), Between State and Market: Mass Privatization in Transition Economies, The World Bank and OECD.

The Economist (1991): "Giving companies away is better than keeping them in state hands," September 21, A18-A20.

The Economist (1993): "Making it work," March 13, 90 – 93.

World Development Report 1996: "From Plan to Market," Oxford University Press.

World Bank (2002): "Transition. The First Ten Years: Analysis and Lessons for Eastern Europe and the Former Soviet Union," Washington D. C.

APPENDIX 2

Table A2.1: Companies listed and traded on the Warsaw and Budapest Stock Exchange

	Warsaw Stock Exchange			Budapest Stock Exchange		
	New listings	Listed companies*	Total turnover - equities (mil. USD)	New listings	Number of equities*	Total turnover - equities (mil. USD)
1990				6	6	48.4
1991	9	9	28.3	14	20	65.6
1992	7	16	167.5	3	23	38.0
1993	6	22	4 345.7	5	28	99.3
1994	22	44	10 305.8	12	40	27.,6
1995	21	65	5 638.7	5	42	347.1
1996	18	83	11 088.2	6	45	1 606.7
1997	62	143	15 964.4	10	49	7 689.7
1998	57	198	17 848.6	8	55	16 139.6
1999	28	221	22 426.0	16	66	14 469.3
2000	13	225	38 913.6	1	60	12 109.5
2001	9	230	19 634.7	1	56	4 836.7
2002	5	216	15 602.8	0	49	5 869.7
2003	6	203	20 512.3	2	53	8 233.1
2004	36	230	32 426.3	1	47	12 774.6
2005	35	255	59 093.0	1	45	24 210.5
2006	38	284	107 806.0	3	43	30 897.4

Note: *depends on the data provided by the stock exchange
Source: Warsaw Stock Exchange
Budapest Stock Exchange
Exchange rates from EIU database

Table A2.2: The main stock market indicators from the PSE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total value of trade (mil. of USD)	309	2154	7362	14485	21436	26647	34351	31682	52246	54770	48474	45607	65717	64075
Value of trade with shares and units	244	1480	4732	9206	7770	5347	4730	6843	3386	6030	9125	18666	43459	37569
% of shares and units in total value of trades	79	68,7	64,3	63,6	36,2	20,1	13,8	21,6	6,5	11	18,8	40,9	66,1	58,6
No. of share and unit issues	971	1028	1716	1670	320	304	195	151	102	79	65	55	39	32
Market cap. of shares and units (mil. USD)	x	12267	18033	19864	15638	12893	13874	11475	8947	14601	22847	37969	55549	70456

Source: Prague Stock Exchange

Figure A2.1: Securities delisted from the PSE (1993 – 2004) – monthly data
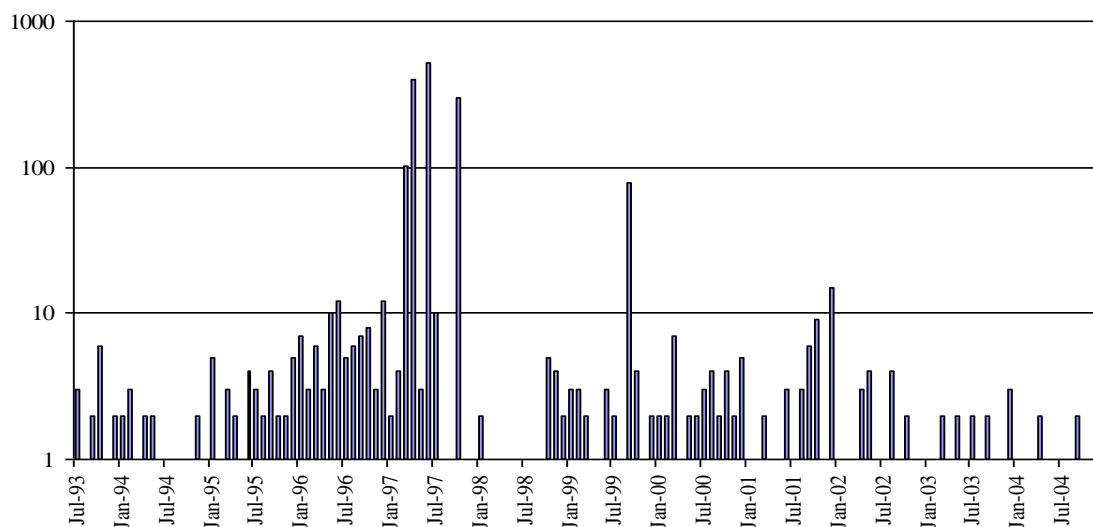
Source: Prague Stock Exchange
Note: The number of delisted shares on the vertical axis is scaled   logarithmically.

Figure A2.2: Companies listed on the Prague Stock Exchange by size
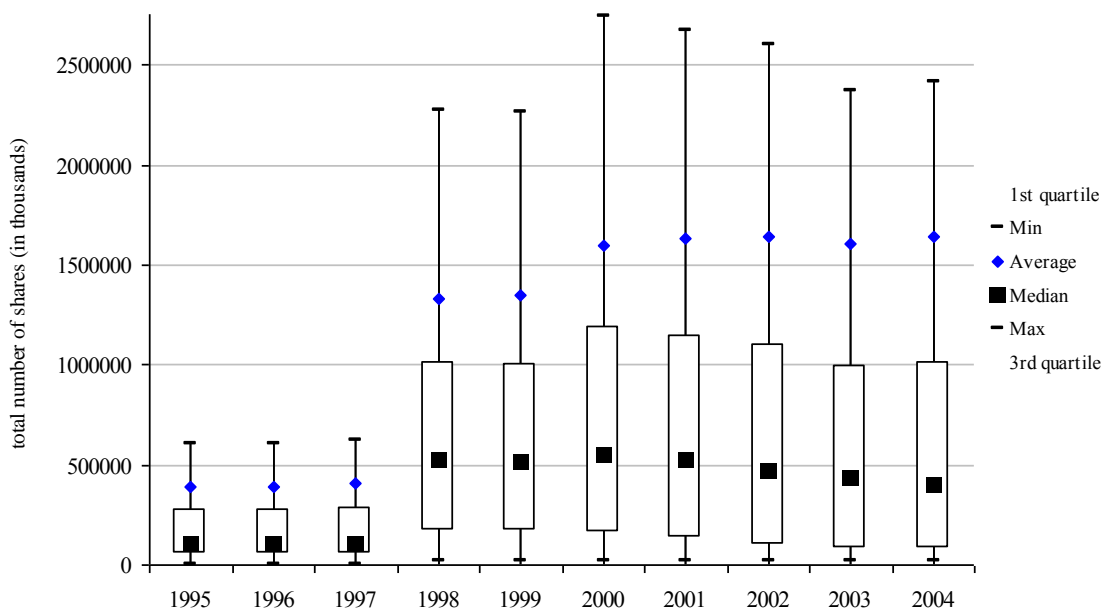
Note: Since the maximum values are extremely high outliers, maximum value is calculated
to be the upper quartile plus 1.5 times the value of the interquartile range
Source: Prague Stock Exchange

Table A2.3: Pre-privatization descriptive statistics of size

PRE-PRIVATIZATION SIZE	Difference between employees one and three years before privatization				Total number of shares			
	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	1,344	262	1,244	87	1,510	269,000	755,000	102,000
Not-delisted	146	198	526	66	154	1,556,000	5,171,000	347,000
REASONS								
Delisted by issuer	132	440	2,657	97	143	788,000	1,628,000	241,000
Delisted by authority	1,166	242	990	86	1,314	173,000	222,000	94,000
Bankruptcy related	46	269	464	126	53	1,228,000	2,484,000	331,000
TIME								
Delisted before 1997	92	260	420	103	99	124,000	176,000	64,000
Delisted in 1997	1,088	246	1,021	84	1,225	148,000	165,000	89,000
Delisted after 1997	164	369	2,387	106	186	1,143,000	1,892,000	609,000

Table A2.4: Pre-privatization descriptive statistics – financial variables

PRE-PRIVATIZATION: FIN. VARIABLES	Difference between sales one and three years before privatization				Profit one year before privatization			
	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	1,321	-32,000	1,706,000	-3,939	1,485	64,000	699,000	6,000
Not-delisted	145	-259,000	1,054,000	-18,225	153	179,000	1,367,000	8,000
REASONS								
Delisted by issuer	131	7,000	1,052,000	549	139	40,000	140,000	6,000
Delisted by authority	1,145	-35,000	1,795,000	-4,477	1,294	66,000	746,000	6,000
Bankruptcy related	45	-92,000	494,000	-3,932	52	80,000	222,000	15,000
TIME								
Delisted before 1997	91	-4,000	383,000	-851	96	58,000	182,000	4,000
Delisted in 1997	1,067	-33,000	1,853,000	-3,880	1,205	66,000	772,000	6,000
Delisted after 1997	163	-46,000	1,015,000	-5,245	184	50,000	152,000	7,000

Table A2.5: Descriptive statistics of privatization variables: average price according to privatization waves

PRIVATIZATION CHARACTERISTICS I	Average price in the first privatization wave				Average price in the second privatization wave			
	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	725	43	59	33	627	32	38	21
Not-delisted	78	58	60	35	47	77	53	82
REASONS								
Delisted by issuer	79	48	56	33	36	56	63	28
Delisted by authority	619	43	61	32	580	31	35	21
Bankruptcy related	27	30	20	24	11	25	13	21
TIME								
Delisted before 1997	72	43	56	30	22	25	29	13
Delisted in 1997	589	42	61	32	539	30	35	21
Delisted after 1997	64	48	50	33	66	49	52	29

Table A2.6: Descriptive statistics of privatization variables: average price

PRIVATIZATION CHARACTERISTICS II	Average price for companies privatized in both waves				Average price (the whole sample)			
	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	158	52	51	37	1,510	39	51	27
Not-delisted	29	90	113	47	154	70	72	42
REASONS								
Delisted by issuer	28	104	72	103	143	61	64	36
Delisted by authority	115	41	37	30	1,314	37	50	26
Bankruptcy related	15	43	33	36	53	32	24	27
TIME								
Delisted before 1997	5	60	59	47	99	40	52	26
Delisted in 1997	97	42	48	27	1,225	37	50	26
Delisted after 1997	56	69	50	50	186	55	51	37

Figure A2.3: Average price for delisted and non-delisted companies
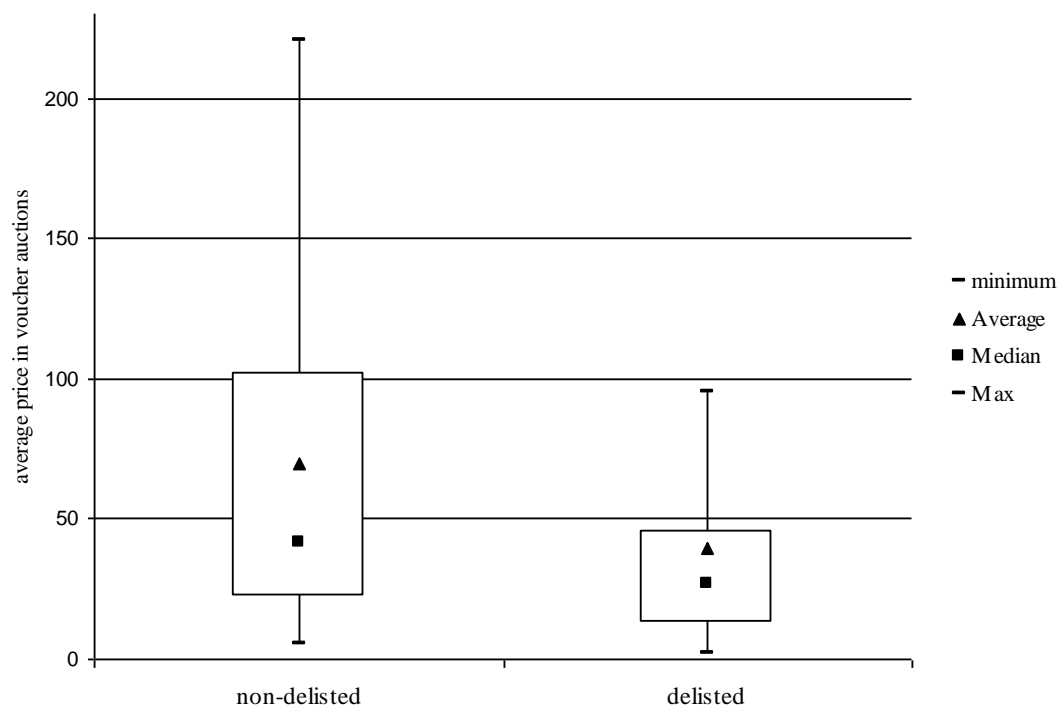
Note: Since the maximum values are extremely high outliers, maximum value is calculated to be the upper quartile plus 1.5 times the value of the interquartile range

Table A2.7: Descriptive statistics of privatization variables: investment priv. funds

INVESTMENT PRIVATIZATION FUNDS	Investment privatization funds holdings after the first wave (% of total number of shares)				Investment privatization funds holdings after the second wave (% of total number of shares)			
	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	881	40	21	41	784	24	22	20
Not-delisted	107	43	22	45	76	18	19	12
REASONS								
Delisted by issuer	106	44	22	43	64	20	21	13
Delisted by authority	733	40	21	41	694	25	22	20
Bankruptcy related	42	37	22	36	26	13	22	4
TIME								
Delisted before 1997	77	36	21	37	27	23	23	16
Delisted in 1997	686	40	21	41	635	25	22	20
Delisted after 1997	118	42	21	40	122	18	21	10

Table A2.8: Proportions of missing observations in subgroups of companies delisted due to different reasons

Variable	NOB	% of total NOB	Reason1:authority		Reason2:issuer		Reason3:bankruptcy		Not delisted	
			non-missing	% of total	non-missing	% of total	non-missing	% of total	non-missing	% of total
Number of shares	1664	100	1314	100	143	100	53	100	154	100
Profit before priv.	1656	99.5	1308	99.5	142	99.3	53	100	153	99.4
Sales before priv.	1648	99	1300	98.9	141	98.6	53	100	154	100
Average price	1664	100	1314	100	143	100	53	100	154	100
Operat. profit 1996	1477	88.8	1209	92	118	82.5	27	50.9	123	79.9
Sales 1996	1465	88	1198	91.2	117	81.8	27	50.9	123	79.9

Table A2.9: Definitions and data sources of the variables included in the analysis

VARIABLE NAME	SOURCE	DESCRIPTION
Industry (ind_id_burza)	PSE classification	the code of industry at the PSE: it includes 19 categories out of which 17 are relevant for us
Employees (e3, e2, e1)	Ministry of Privatization of the Czech Republic	number of employees in the company before privatization
Total number of shares (tns)	Ministry of Privatization of the Czech Rep. (MP CR)	the total number of shares of a firm i.e. capital of a firm divided by the value of one share (1000)
Sales (s3, s2, s1)*	MP CR	sales prior to privatization (three, two and one year)
Profit (p3, p2, p1)*	MP CR	profit prior to privatization (three, two and one year)
Debt (d3, d2, d1)*	MP CR	debt prior to privatization (three, two and one year)
Privatization wave (cvl)	MP CR	the wave in which certain company was privatized (first or second); we also distinguish companies that wereprivatized in both waves
National Property Fund ownership share (npf)	MP CR	proportion of company's shares that based on the privatization project were supposed to be owned by the National Property Fund
Average price (ap)	MP CR	average price of the firm's shares sold in the voucher auctions; sold points divided by shares sold
Number of shares in voucher privatization (nscp_tns)	MP CR	the number of shares offered in the voucher privatization as % of total number of shares
IPFs' holdings after the first wave (ipf1_tns)	Prague Securities Centre	shares held by the investment privatization funds following the 1st privatization wave (% of total number of shares)
IPFs' holdings after the second wave (ipf2_tns)	Prague Securities Centre	shares held by the investment privatization funds following the second privatization wave (% of total number of shares)
Single largest owner (slo)	Prague Securities Centre	% of shares held by the single largest owner
Profit (1996 - 2003)	ASPEKT database	profit defined by Czech accounting standards
Oper. profit (1996 - 2003)	ASPEKT database	operational profit defined by Czech accounting standards
Sales (1996 - 2003)	ASPEKT database	sales defined by Czech accounting standards
Total assets (1996 - 2003)	ASPEKT database	total assets defined by Czech accounting standards
Total liabilities (1996 - 2003)	ASPEKT database	total liabilities defined by Czech accounting standards

Note: The data marked with * are based on the socialistic accounting

Table A2.10: Results of the McNemar-type test (observed frequencies and χ^2)

	outcome	OUR MODEL		
		Incorrect	Correct	Σ
NAIVE ESTIMATOR	Incorrect	10	113	123
	Correct	1	1346	1347
	Σ	11	1459	1470

Note: Both models predict correctly 1346 delisted companies and 10 that stayed, however our model was in comparison to the naive estimator mistaken only once, while the naive estimator incorrectly predicted 113 cases. This indicates the prediction power of our model that is also confirmed by the test statistic $\chi^2 = \dfrac{(n_{12} - n_{21})^2}{n_{12} + n_{21}}$ that has an asymptotic χ^2 distribution. Its value is 110,04 which makes our results significant at all levels.

CHAPTER 3

DELISTING IN THE SLOVAK AND CZECH REPUBLIC: GRADUAL VERSUS BIG BANG APPROACH[78]

3.1 Introduction

This chapter provides further insights concerning the delisting process in transition countries. We analyze the process of delisting share issues from the Bratislava Stock Exchange in Slovakia. In this analysis we utilize a special relationship between the Czech and Slovak economies in order to investigate the role of delisting and the way it is implemented for the stock market emergence. Recent development suggests that even though these two economies share identical roots and the first wave of mass privatization was conducted in the same way in both countries, the subsequent stock market development in the Czech and Slovak Republic did not follow the same path.

Common background of both countries provides us with the opportunity to use the Czech case as a benchmark in this study. It is a natural reference point for the analysis of Slovakia, since both countries were part of the former Czechoslovakia until 1993. Nevertheless, there are several issues that make the analysis of the Slovak delisting different. The most important one, from the practical point of view, is the availability of data. The dataset we have available for Slovakia is smaller. This is not only due to the fact that Slovakia and its market is smaller but also because the second privatization wave did not materialize in the Slovak case as planned and consequently we do not have important explanatory variables connected to privatization for almost half of the listed companies. Nevertheless, our sample still contains almost 500 companies, which is sufficient for the analysis. Yet another difference between the two countries is the fact

that the stock exchange authorities seem to adopt different strategies (not only towards delisting) which led to differences in the subsequent development on the Czech and Slovak markets. This suggests that delisting, its implementation as well as other decisions of the stock exchange authorities are very important for further functioning of the market. The aim of this paper is not only the investigation of the delisting process in the Slovak Republic but also utilizing the Czech and Slovak connection to outline the strategies for successful stock emergence in other transition economies.

The following section provides description of the Slovak stock market development and the delisting process in Slovakia. Afterwards we describe the data and methodology applied. In section 3.5 we provide results of the estimations. Section 3.6 deals with the connection between the Czech and Slovak market, the case of separated twins, and section 3.7 concludes.

3.2 Privatization and the development of the Slovak stock market

Similar to the Czech Republic, the development of the stock market in Slovakia is closely related to the mass privatization process. The Bratislava Stock Exchange (BSSE) was established at the beginning of the 1990s and, together with the Prague Stock Exchange, started trading on April 6, 1993. This fact is connected to the first wave of privatization which took place in the Czech as well as in the Slovak Republic between 1991 and 1993[79]. The situation in Bratislava was very similar to Prague. Based on the approved privatization projects there were 503 companies privatized in the first wave and their shares were placed to the stock exchange by law. The companies from the first privatization wave were introduced in 1993 and at the end of this year there were 512 share and unit issues[80] on the BSSE. Unlike the Czech Republic, the second privatization

---

[79] Registration of individuals and investment privatization funds (IPF) started at the end of 1991 and ended only at the end of 1992. Afterwards the shares were distributed in May 1993 in Slovakia. For more detailed description see chapter 11 in Marcinčin and Beblavý (eds.), 2000.

[80] Unit issues are securities issued by the privatization funds and the stock exchange reported them together with the share issues. Nevertheless, only share issues are included in our analysis.

wave that was planned did not materialize as originally designed in Slovakia[81]. Nevertheless, some new companies still entered the market and thus the number of share issues on the stock exchange increased. There were 850 and 970 share and unit issues listed on the BSSE at the end of 1995 and 1996 respectively.

Until 1997 trading of shares was very lively and accounted for more than half of the total turnover on the stock exchange (see Table A3.1 in the appendix). Exceptionally high was this proportion in 1994, right after the first wave of mass privatization. At that time trading in shares accounted for 86% of the total turnover on the stock exchange. Similar to the situation in Prague, all this active trading was connected to the post privatization period when market grew very quickly. As Barto and Kmeť (2000) point out, the reason for this extraordinary growth was simply fight for majority ownership shares in the companies privatized in the first privatization wave and thus the stock market was a means for gaining the control over these companies. Afterwards, the authors continue, when the ownership structure was consolidated, the stock market became "redundant". This trend is visible not only in turnover of shares, but also in the development of the Slovak share index (SAX), (see Figure A1.1 in the appendix 1) and the real market capitalization of shares and units. Stock market capitalization was the lowest in the OECD countries in 2000 (see Figure A3.1 in the appendix). All of these market measures exhibit significant worsening after 1997. Moreover, a great majority of trades of shares was conducted in the form of direct trades in 1997[82] and for unrealistic prices (BSSE Factbook, 1997) i.e. suspicious prices that are far from the fundamental value. The BSSE report further specifies other factors that contributed to the worsening of the situation. The first one is the transformation of the investment privatization funds into joint-stock companies that was going on for a long time and caused absence of institutional investors on the market[83]. This is one of the factors hampering stock market development that is stressed also by the OECD in their report on Slovakia (2002).

---

[81] This is connected to changes of the government in 1994. Moravcik's government was planning the second privatization wave (it was supposed to start 15.12.1994) and about 3.3 mil. Slovak citizens registered to participate in it. However, in the meantime government changed and Meciar, who took the office, decided to cancel the second wave.

[82] Anonymous trades accounted for less than 1% of the total value of trades with shares.

[83] These investors, especially domestic ones, are very important for the emerging stock market as was the case e.g. in Poland.

Another one is the lack of foreign investors' interest in the Slovak market. Nevertheless, we, as well as Barto and Kmeť (2000), believe that the situation was primarily caused by a nonstandard approach to market creation which led to having hundreds of companies on the stock exchange.

After the ownership structure of privatized companies was settled, trading with shares fell dramatically[84] and this is reflected in the development of all of the above mentioned stock market indicators. Bačišin (2001) mentions several attempts to restore trading with shares in this period. The first incentive was included in the Programme Declarations of the Government of the Slovak Republic in 1998. Based on this document the citizens were supposed to get the chance to acquire shares of some important and strategic companies. Unfortunately, this had never materialized even though in February 2000 BSSE together with the Association of Securities Dealers and Association of Investment Companies issued a joint appeal to the Slovak government to offer strategic companies or at least some part of their shares also to portfolio investors through capital market.

Besides this attempt, there were several other projects targeted at restoring of trading with shares implemented on the BSSE. The first one was trading of shares in the new module of market makers that started in December 2000. Unlike Prague Stock Exchange where market makers module was introduced in 1998, it did not work in Bratislava, since there were not enough trades with shares, even outside the price-setting segment. At the beginning there were several share issues included in the market makers module but they were delisted in 2004 and there are no share issues traded in this module nowadays. The second project concerned so called New Market that was meant to attract quickly growing small and medium size companies willing to acquire new capital through the issuance of shares. Even though this market was inspired by similar markets functioning in the developed economies, it has not been successful in Slovakia. Moreover, a new structure of the market was introduced in July 2001. To make the market more transparent, the former market of listed securities was divided into a main

---

[84] Due to the finished ownership concentration, the number of securities in free float has declined significantly (Bačišin, 2002).

listed market, a parallel listed market and a new listed market. Free market was designed for so called unlisted securities which were still at the stock exchange, however did not need to fulfil requirements like the listed ones.

Most recently, the activities of the BSSE focus to benefit issuers of securities and attract them to the local market[85]. Since 2006 financial market supervision is under the National Bank of Slovakia which eliminates complicated reporting and makes communication with the regulator more efficient. From March 2006 BSSE owns the Central Securities Depositary which makes the registration of new securities faster and, what is even more important from the point of view of issuers, less costly. Despite all these efforts of the BSSE, the situation does not seem to be improving. This may indicate that the stock exchange alone is not always able to solve the problems of the emerging stock market. Even though all the governments so far have declared their support to the capital market development, in reality they have not done enough; especially because the promised privatization of the minority shares in some strategic enterprises through the stock exchange has not materialized (TREND, 2006) and thus companies that could have been interesting for investors are not listed at the stock exchange.

The Slovak stock market can still be characterized by a relatively high number of illiquid publicly traded securities[86]. SAX, the official share index of the BSSE, consists of only five share issues. Turnover with shares has decreased dramatically in 2005 and 2006 (see Table A3.1 in the appendix). Proportion of the anonymous trades is rather low and this situation does not contribute to generating true prices. Thus, market prices hardly reflect the real situation in the publicly traded company. Issuers are still not used to provide all information necessary to investors and they do not care about their shareholders, who they still consider a kind of burden left from the privatization (Gajdzica et al., 2002). This development makes it clear that companies and their willingness to be publicly traded are essential for the efficient stock market to emerge. New companies, however, are not willing to enter the market that in fact does not work

---

[85] Slovak companies that plan to issue new shares do so only abroad (e.g. SkyEurope Airlines issued its shares on the Warsaw and Vienna stock exchanges, IT company Asseco is listed in Warsaw as well).
[86] At the end of 2006 there were 256 shares and units on the BSSE, out of which only 10 are so called listed securities and the rest are unlisted (regulated free market).

(Hospodarske noviny, 2006). Thus, a kind of vicious circle emerges and some consider the integration of the Slovak market into broader Central European market to be the only chance for its further existence.

3.2.1 Delisting process in the Slovak Republic

Similar to the Czech case, some companies placed on the BSSE were not able to benefit from the possibility of being publicly traded and were, therefore, later excluded from public trading i.e. delisted. The delisting process, unlike that for the Prague Stock Exchange (PSE), started later and, based on the number of companies that remain listed on the BSSE[87], it may not be over. The number of share issues that remain listed on the BSSE also suggests that the process of delisting on the Slovak market has followed a different path in comparison to the Czech case (see Figure A3.2 in the appendix). The main delisting wave took place five years later than on the PSE and the reasons for delisting in Slovakia were more uniform. The following Table 3.1 shows the number of delisted shares in more detail.

The number of delisted companies in the period 1994 – 1997 was, unlike the Czech Republic, not high. Even though there were altogether 49 share issues with which trading was terminated during this period, only about one third of them was really delisted. The rest were securities belonging to companies that were due to e.g. organizational changes just issuing the shares with a new ISIN[88] number, which were further traded on the stock exchange and thus these ones were not truly delisted. Therefore they are not considered as delisted in our empirical analysis.

In the following four years the number of delisted companies was not significantly high either. Relatively more companies delisted in 1998 were those ones that were deleted from the Slovak Companies Register already earlier and in fact ceased to exist. However, in most of these cases they were delisted only in a year or later after they were cancelled in reality. This was caused by the fact that liquidators or other authorities

---

[87] At the end of December 2006 there were 256 share issues, including 46 issues of units listed on the BSSE. Out of them only 5 issues belong to the main listed market. On the other hand, there were 32 shares and units listed on the Prague Stock Exchange (out of them 10 were traded on the main market).
[88] This happened most probably because the requirements of the security have changed.

responsible for the cancellation of the company did not report this to the Securities Register and thus it could not announce this fact to the BSSE.

Table 3.1: Share issues delisted from the BSSE and PSE by years

DELISTING BY YEARS	All share issues delisted from the BSSE		Shares from the 1st priv. wave delisted from BSSE	All share issues delisted from the PSE
	NOB	Percent	NOB	NOB
1994	1	0.14	0	10
1995	9	1.3	9	19
1996	2	0.29	0	61
1997	5	0.72	4	1225
1998	19	2.74	14	11
1999	8	1.15	3	79
2000	14	2.02	3	28
2001	20	2.88	2	34
2002	339	48.85	201	14
2003	95	13.69	49	10
2004	68	9.8	46	10
2005	73	10.52	34	6
2006	41	5.91	17	9
Total	694	100	382	1526

Source: Bratislava Stock Exchange, Prague Stock Exchange (PSE) and author's calculations
Note: The first privatization wave column includes only companies from this wave included in our sample, i.e. industrial companies (not the financial ones).

The major wave of delisting took place only in 2002 and the majority of securities was delisted due to not fulfilling their information obligation towards the BSSE. The process of delisting consisted of two phases. At the beginning, trading with the share issues of companies which had not fulfilled information obligation was suspended. If the necessary information was not supplied within a given period of time, the stock exchange decided about exemption from trading i.e. delisting. Based on the data from the BSSE the first suspension of trading concerned 496 share issues (of 483 issuers) and it took place on October 17, 2001. Then, when the required information obligation concerning the first half of the year 2001 was not fulfilled, the share issues were delisted on May 1, 2002. This decision concerned 314 share issues of 308 issuers. The groups of share issues delisted due to not fulfilling information obligation that followed afterwards were

smaller[89]. Nevertheless, the trend is clear: companies not fulfilling information obligation at the end of the year were delisted at the end of September of the next year and those ones that did not fulfil half year information obligation were then delisted at the end of December of a given year. The following figure shows that fulfilling information obligation has improved significantly after the 2002 wave of delisting. Yet another evidence is the fact, that most of the share issues delisted in 2004 - 2006 were delisted on the issuer's request and fulfilment of the information obligation did not play a role during this period.

Figure 3.1: Fulfilling information obligation by companies

□ number of companies registered on the BSSE
▨ number of companies that fulfilled information obligation towards the BSSE
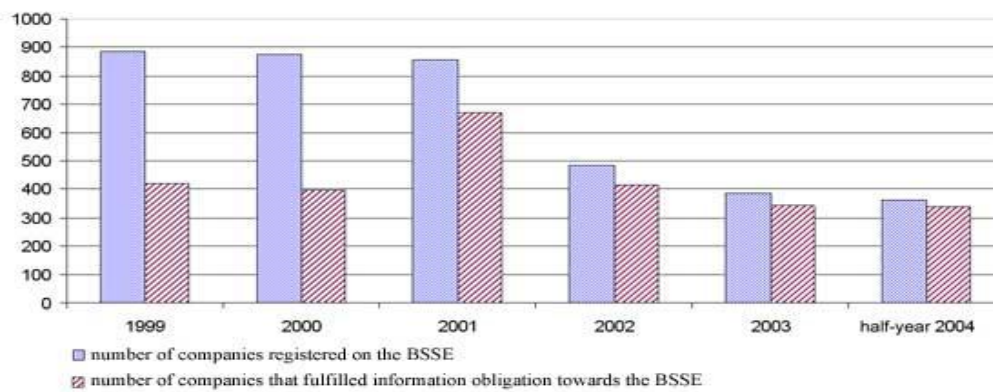
Source: Profit (May 16, 2005): Ročná správa o hospodárení spoločnosti (Yearly report about the company's results).

In addition to not fulfilling the information obligation, the data provided by the BSSE enable us to distinguish the other two reasons for delisting. The first one is the decision of the authority, which can be either the BSSE or the former Securities Register (nowadays the Central Securities Depository) or some regulatory institution (Ministry of Finance, National Bank of Slovakia or the former Financial Market Authority[90]). As the following Table 3.2 indicates, only 6 percent of all delisted companies were delisted due to the decision of the authority. The other companies were delisted because they themselves decided to stop being traded on the exchange. Decision of the issuer means,

---

[89] 36 share issues on October 7, 2002; 24 share issues delisted on January 14, 2003; 26 on September 26, 2003; 4 share issues on December 29, 2004; 11 on September 28, 2004; 5 on December 28, 2004; 17 on September 27, 2005 and 7 on December 30, 2005.
[90] From January 1, 2006 all its responsibilities were taken over by the National Bank of Slovakia.

that the general assembly of the company agreed that the company would not be publicly traded anymore. Not fulfilling the information obligation is in fact also the decision of the issuer, however, of a different nature. In this case the initiative to delist does not come directly from the issuer because the stock exchange initiates the whole process and the issuer only decides to accept or not to accept the conditions set. All in all, unlike the Czech Republic where most of the companies were delisted due to the decision of the authority, the majority of the Slovak delisted companies decided about their delisting themselves. This is most probably connected to the fact that the delisting wave in Slovakia happened five years later and during this time the companies could judge what kind of benefits public trading of their shares brings and if they are willing to stay publicly traded. At the same time, this development suggests that the Czech authorities were more aggressive and decided to "clean" the market even before the companies themselves observed the situation and decided not to be publicly listed.

Table 3.2: Number of delisted companies by reasons (1994 – 2006)

REASONS FOR DELISTING	All share issues		1st privatization wave	
	NOB	Percent	NOB	Percent
Decision of the authority	42	6.33	22	5.74
Decision of the issuer	227	34.19	112	29.24
Information obligation	395	59.49	248	64.75
Total	664	100	382	100

Note: The first privatization wave column includes only companies from this wave included in our sample, i.e. industrial companies (not financial ones)

3.3 Methodology

The impact of various factors that belong to pre-privatization, privatization and post privatization subgroup on delisting is estimated using a similar binary regression model as it was in the case of the Czech Republic in chapter 2[91]. In the Slovak case, however, there is no need to estimate the model in two stages. With the exception of four companies, all the firms included in our Slovak sample report their results even before privatization and we do not face the problem of missing data. We estimate a binary

---

[91] For more detailed description of the different determints of delisting and details of the model see parts 2.3 and 2.4.

regression model where the dependent variable is the probability of delisting and the explanatory variables include pre-privatization and privatization factors as well as the financial indicators and fulfilling of the information obligation in the period after privatization. The logit model has the following form:

$$P(del_i = 1) = \alpha + \beta_1 \cdot tns_i + \beta_2 \cdot nscp\_tns_i + \beta_3 \cdot prof\_tns_i + \gamma_1 \cdot ap_i + \gamma_2 \cdot npf\_dum_i +$$
$$+ \gamma_3 \cdot for\_dum_i + \gamma_4 \cdot slo95_i + \delta_1.op\_g_i + \delta_2.de\_g_i + \delta_3.rep_i \qquad (3.1)$$

where

- *del* is a dummy variable that equals 1 for the company that was delisted before the end of 2006 and 0 for not-delisted

- *tns* is total number of shares of a company (in millions of shares) which in fact reflects the capital of a given company[92]

- *nscp_tns* is the share of company privatized in the voucher privatization

- *prof_tns* is profit per share one year before privatization

- *ap* is average price (in points) of a company's shares in the privatization auction (as we expect nonlinear relationship, it enters the model in quadratic as well as cubic form)

- *npf_dum* is a dummy variable that equals one if the National Property Fund had an ownership share in a company (based on the information from the company's privatization project)

- *for_dum* is a dummy variable that equals one if a foreign owner had an ownership share in a company (based on the information from the company's privatization project)

- *SLO95* is a dummy variable that equals one if the ownership share of the single largest owner in a given company was higher that 50% in 1995

- *op_g* is growth in operational profit defined as the growth rate of average operational profit in the industry (between 1996 and 1997), excluding the company itself

---

[92] The nominal value of original shares was 1000 crowns.

- *de_g* is growth in total debt defined as the growth rate of average total debt level in the industry (between 1996 and 1997), excluding the company itself

- *rep* is a dummy variable that serves as a proxy for fulfilling of the reporting obligation of the company; it equals one if company has not reported its operational profit in 2000 even though it was supposed to do so, 0 otherwise

The data for the variables concerning privatization come from the time when the first privatization wave took place, i.e. 1993. Ownership data are from 1995, the year when ownership structure of the companies consolidated after the privatization. The growth in operational profit and the growth in total debt are defined as the growth rate between the current and the following year of average value in a given industry, excluding the company itself. This way we avoid possible endogeneity problems as there might be connections between some explanatory variables included in the model (e.g. post privatization profit may be connected to the average price per share in the privatization). The years under consideration are 1996 and 1997. This is the time period after privatization when the ownership structures of the companies from the first privatization wave that are subject of our investigation were already consolidated. At the same time this time period is also preceding the wave of delisting and financial indicators could thus provide guidance in identifying the companies that are going to be delisted.

3.4 Data

The dataset consists of all companies that were listed on the BSSE from the beginning of trading in 1993 till 2006. However, due to the fact that there was no second privatization wave in Slovakia, the estimations are conducted on the subsample of companies that were privatized in the first mass privatization wave and then placed on the stock exchange. This subsample consists of 496 industrial companies[93] and contains privatization data from the Ministry of Privatization and the Ministry of Finance. This data comes from the years 1991 -1993. Financial data for the post privatization period $1996 - 1997$ come from

---

[93] Based on the privatization data, there were 503 Slovak companies privatized in the first privatization wave. Nevertheless, when linking privatization data to the data provided by the stock exchange, it was possible to link 500 companies. Another 4 companies were excluded since these were financial institutions, not industrial firms.

the INFIN database[94]. The data concerning delisting were provided by the Bratislava Stock Exchange. Details about the legal status and further existence of the delisted companies are taken from the Ministry of Justice of the Slovak Republic Companies[95]. When identifying the reasons for delisting all information that was available at the time was taken into consideration. Detailed description of the variables used in the estimation is provided in the appendix (Table A3.7).

Industry dummy variables that we use to calculate growth opportunities are based on OKEC classification, which is used in the INFIN database as well as in the BSSE data. The main activities of companies, have however changed over time and since we had only available the most recent industry classification, we had to adjust it so that it corresponds to the time period we consider when calculating growth opportunities i.e. 1996 – 1997. The industry data corresponding to the analyzed period come from the Ministry of Justice of the Slovak Republic Companies Register.

We also use data concerning a single largest owner of the company after the privatization. It includes his ownership share and identification of the owner's type. We distinguish between domestic and foreign owners as well as the fact if the owner is a bank, company, individual entrepreneur, state, privatization fund or other subject. This data come from the Central Securities Depository of the Slovak Republic.

3.4.1 Data description

Descriptive statistics that we use for the subgroup of delisted and not-delisted as well as for the subgroups concerning different reasons and time of delisting exhibit quite a high degree of variability. This is most probably connected to the heterogeneity of the companies that were privatized in the first privatization wave.

Pre-privatization variables that are included in our analysis can be divided into two groups. The first one concerns the size of a privatized company. It includes the number of employees and total number of shares which in fact reflects the capital of a

---

[94] This database is provided by the company INFIN Ltd. (Information in Finance). More information available at http://www.infinet.sk.
[95] www.orsr.sk

given company. The second group contains financial indicators for the period before the privatization took place. The size of the company measured by the number of employees is decreasing for all the companies with approaching privatization, which can be the sign of the on-going restructuring process. There are however no significant[96] differences in the number of employees between delisted and not-delisted companies or depending on the reason for delisting (see Table A3.2 in the appendix). On the other hand, there are significant differences in size measured by the number of employees as well as the total number of shares when we take time of delisting into account. Here we distinguish among companies delisted before the major wave in 2002, companies delisted in 2002 and companies delisted afterwards. Our results show that the smallest companies were delisted already before the main wave. This points out to the fact that the size of the company, similar to the Czech case, matters for delisting. Moreover, there are significant differences between delisted and not-delisted companies when the indicator of total number of shares is used. From the financial indicators included in the second group of pre-privatization indicators only the profit one year before the privatization exhibits significantly differences in values for different subgroups of companies (see Table A3.3 in the appendix). Based on our nonparametric test it is significantly different for delisted and not-delisted companies and also for the companies delisted due to different reasons. As one would expect, it is higher for not-delisted companies, thus indicating that they might be strong enough to survive on the stock exchange.

Further we examine several variables connected to the privatization process (see Tables A3.4 and A3.5 in the appendix). The majority of these indicators exhibit significantly different values for various subsamples of companies. The most important from our point of view are the differences in average price which is significantly different for all subgroups that we consider. Companies that were not delisted have higher average price in comparison to the delisted ones. This indicates that bidders in the privatization process were able to judge the future prospects of the companies based on the then available information. The lowest average price concerns the companies that were delisted due to not fulfilling the information obligation. This result is confirmed also

---

[96] We employ nonparametric K-sample test on the equality of median to test for this.

when accounting for the time of delisting – the lowest average price concerns companies delisted in 2002 during a big wave of delisting which arose especially due to not fulfilling the information obligation. Thus these might be the weakest companies that had to be pushed out of the stock exchange by the authorities.

The ownership structure presented in the privatization plan is different for delisted and not-delisted companies. In delisted ones, the National Property Fund (NPF) tends to hold lower proportion of shares and foreign investors tend to be stronger in not-delisted companies, which is in line with our expectations. Moreover, there are significant differences when considering the NPF ownership and the time of delisting. Companies with higher NPF ownership share tend to be delisted later because NPF is a shareholder with a rather strong position. Another evidence of a strong ownership position of NPF as well as foreign owners is the fact that when accounting for delisting reasons delisting by issuer is the most common for companies with high NPF or foreign share.

Finally, the descriptive statistics of the post-privatization variables included in our model are summarized in Table A3.6 in the appendix. The indicators of growth in operational profit and growth in total debt as they were defined above are investigated. As expected growth of operational profit that in fact represents the potential profit figure is significantly lower for delisted companies and for the ones delisted in 2002 or earlier. On the other hand, except for delisted and not-delisted companies there are no significant differences in the growth rate of total debt, which might indicate that all the companies were indebted to certain extent after the privatization since they needed resources for restructuring.

This brief inspection of the pre-privatization, privatization and post-privatization variables suggests that there are certain differences between delisted and not-delisted companies and we are going to examine these in more detail further.

3.5 Estimation results

The above described logit model is run on the sample of all companies listed on the BSSE after the first wave of voucher privatization. The results of our estimation are summarized in the following Table 3.3.

Table 3.3: Logit model for delisting (y=1 for delisting)

LOGIT ESTIMATION	Results		Interpretation	
Pre-privatization factors	Estimated coefficient	Standard error	dP/dX	Effect of one st.deviation change
Total number of shares (millions of shares)	-0.242	0.247	-0.036	-0.034
Profit before privatization (scaled by book value)	-0.189	0.544	-0.028	-0.007
Privatization factors				
Proportion of shares in mass privatization	-0.007	0.013	-0.001	-0.018
Average price in voucher auction (in points)	-0.029 *	0.016	-0.004	
Average price (quadratic)	0.0004 **	0.0002	0.0001	
Average price (cubic)	-1.3E-06 ***	5.2E-07	-1.9E-07	
Average price (overall effect)			-0.003	-0.130
National property fund ownership	-1.074 **	0.496	-0.160	
Foreign owner ownership share	-2.040 **	1.016	-0.303	
Single largest owner dummy (1995)	0.774 *	0.454	0.115	
Post-privatization factors				
Operational profit growth	-0.010 **	0.005	-0.002	-0.045
Total debt growth	0.005 *	0.003	0.001	0.042
Reporting dummy	2.476 ***	0.471	0.368	
Constant	1.519	1.354	0.226	
Number of observations	489			
Scaled R^2	0.167			

Note: The table contains estimation results for the logit model. We report estimated coefficients, their significance (* significant at 10%, ** significant at 5% and *** significant at 1%) as well as marginal effects (dP(y=1)/dX).

The explanatory variables describing the pre-privatization period do not show up significant in the estimation. Profit before privatization was not significant in the Czech case either and this fact is most probably connected to the quality of this data that is based on the socialist accounting. In this sense, profit does not necessarily reflect real profit and the situation in a company but only production. Apart from the profit indicator, unlike the Czech Republic, even the company size does not play a role as determinant of delisting in Slovakia. Such a result is surprising and rather nonstandard, especially when taking the situation in the Czech Republic as benchmark. It may indicate that there were not enough companies delisted from the Slovak market or the size of delisted companies follows a random distribution. Indeed, unlike Czech Republic, there were also relatively big companies delisted from the stock exchange since after receiving majority ownership share some owners decided not to be listed anymore.

Almost all coefficients of the explanatory variables connected to the privatization process are significant. The only exception is the proportion of the company privatized in the voucher privatization. Descriptive statistics confirm that it was relatively high for the majority of the observations and this low variability might have contributed to the non-significance of the estimated coefficient. Nevertheless, the most important factor is the average price in voucher auctions which in our setting could be considered a proxy for share price. The results correspond to our expectations as higher price in voucher auctions indicates a higher valuation of the company and thus better future prospects and lower probability of delisting. We expect nonlinear relationship between average price and delisting and therefore average price enters the model also in quadratic and cubic form. Their combined effect on delisting is significant and negative. A one standard deviation increase in the average price decreases the probability of delisting by 13 percent.

The ownership share of the National Property Fund (NPF) and the foreign owners, as reported in the privatization projects, is an important determinant as well. The results show that the probability of delisting decreases by 16 percent in the presence of the NPF. Furthermore, the foreign owner contributes to decreasing this probability even more, by 30.3 percent. These results point out that these groups of owners had significant impact on privatized companies and the ownership structure is one of the key factors that determine delisting. The role of the single largest owner with majority ownership share is also important. Probability of delisting increases by 11.5 percent for the companies where single largest owner owned more than 50% of the company's shares at the end of 1995, i.e. in the time when the ownership structure after the first privatization wave was more less settled. The same holds true when the percentage of company owned by a single largest owner is considered instead of the dummy variable for more than 50% ownership share. The higher the ownership share of a single largest owner, the higher is the probability of being delisted[97]. We have also accounted for the type of the single largest owner in our estimations, nevertheless it was not significant.

The main delisting wave took place in 2002 and therefore post-privatization firm

---

[97] We do not report these results since the estimated coefficients for the other variables are in line with the ones reported for the main model.

characteristics are also included in our model. All of the estimated coefficients in this group are significant. The most important from them is the dummy variable describing fulfilling of the reporting obligations. It is constructed based on the availability of data for a given company in 2000, long enough before the main delisting wave took place in 2002. According to these results, the probability of delisting increases by 36.8 percent if a company does not fulfil its reporting obligation in 2000. This result is also in line with the fact that most of the companies delisted in 2002 left the market due to not fulfilling information criteria required by the BSSE.

The other two post-privatization variables assess financial situation of a company; we use the indicator of operational profit and total debt. In order to prevent problems with possible endogeneity in estimation, we construct growth in operational profit and growth in total debt variables as the growth rate between the current and the following year of average value in a given industry, excluding the company itself. Even though the estimated coefficients in our model are significant with expected signs, their influence is lower than in the case of the reporting dummy variable which might also be a consequence of the way they were constructed. The probability of delisting decreases with increasing growth potential in operational profit so that one standard deviation increase in operational profit growth constitutes a 4.5 percent decrease in the probability of delisting. On the other hand, one standard deviation increase in the growth of total debt brings about 4.2 percent increase in the probability of delisting. These results are in line with our expectations and show that future prospects reflected in our growth variables are important determinants of delisting.

Table 3.3 further shows that the measure for goodness of fit - R^2 is not very high. It is however sufficient when taking into consideration the nature of the estimated model and a relatively high proportion of delisted companies in our dataset. Similar to the Czech case, we apply a McNemar-type of test suggested by Hanousek (2000) to compare our model to a naive estimator on the basis of their predictive accuracy. The results summarized in Table A3.8 in the appendix confirm that our estimator dominates the naive estimator in terms of prediction accuracy. This way the significance of our results is confirmed. They show that there are several economic variables which could have been

used when placing privatized companies on the stock exchange after the first privatization wave and thus prevent massive delisting.

3.6 Czech and Slovak connection: tale of separated twins

Czech Republic is a natural reference point for the analysis of Slovakia, since both countries were part of the former Czechoslovakia and share common historical and cultural background. Moreover, mass privatization which prompted stock market emergence was originated using the same concept in both countries. The first privatization wave was conducted in the same way. On the other hand, the second one did not materialize as originally designed in Slovakia. Despite this fact a lot of new share issues entered the Slovak stock market in 1995 and 1996 and thus the situation on the market was basically the same as in the Czech Republic; at both the Prague Stock Exchange (PSE) as well as the BSSE the maximum number of listed share issues was achieved in 1996.

Afterwards however, the development on both markets started to differ. While 1225 share issues were delisted in four waves during 1997 in the Czech Republic, in Slovakia no significant delisting took place until 2002 when 339 share issues were delisted from the BSSE. Then, between 2003 and 2006, another 280 issues were delisted. Nevertheless, as it was already mentioned, there is still a relatively large number of share issues listed on the BSSE even nowadays. This development suggests two different approaches to delisting.

Czech institutions implemented a kind of a "big bang" strategy i.e. a lot of issues that did not fulfil specified criteria were delisted within a short period of time. This way market was cleaned relatively quickly, became more transparent and this contributed to its attractiveness for investors. Development on the stock exchange measured by the PSE index confirms its gradual growth after this cleaning. On the other hand, even though some delisting took place in Slovakia, the stock exchange authorities are still trying to keep companies listed (on the so called free market), work with companies individually, explain the advantages of being listed to them and they seemed to hope that the companies would then, later on move to the listed market. It is however rather difficult to

proceed with this kind of strategy when market is not working, it does not fulfil its main functions and consequently provides no motivation for companies to stay listed. In fact, Slovak companies have never experienced a really functioning stock market which only adds uncertainty. Taking into account the size of the Slovak market, it is also possible to speculate that the gradual strategy of BSSE is preferred to the "big bang" one because otherwise the existence of the whole market could be seriously threatened[98].

Description of the development on both markets suggests that there are significant differences between the Czech and Slovak market which we also confirm in the following estimations. Similar logit model as described above in the equation (3.1) is run on the sample including all the Czech and Slovak companies privatized in the first privatization wave. The explanatory variables are in the similar way as before divided into the pre-privatization, privatization and post-privatization ones. In this case, however, a country dummy variable based on the company's location is added into the model. It indicates if a company is Czech or Slovak. Dependent variable is again dummy variable for delisting. Results of the estimation are displayed in the following Table 3.4.

Similar to our previous estimations, all the estimated coefficients with the exception of the pre-privatization profit are significant and have expected signs. The most influential is the country dummy variable indicating that the probability of delisting of a Slovak company is 17 percent lower than for a Czech one. This result is highly significant and it is in line with the strategy implemented by the BSSE that is trying to keep the companies listed on the stock exchange as long as possible and gradually work on improving their situation.

We have also tried to add interaction terms into main model, however, the corresponding estimated coefficients were not significant. This indicates that the selected determinants of delisting matter in the same way at both markets.

The aforementioned description of the Czech and Slovak emerging stock markets and their unique common background suggest that this case of "separated twins" can be used not only to uncover the reasons for massive delisting and its effect on the market

---

[98] Even nowadays when the market formally exists, there are voices suggesting closing it completely (Let's Be Honest and Close the Stock Exchange, Hospodarske noviny, 25.7.2006).

functioning but also to identify strategies critical for a successful stock market development in other emerging economies. A close connection between these two markets and a very similar unfavorable development on both markets in the first half of the 1990s, despite different institutional changes, emphasizes the importance of mass privatization implemented in these countries. Moreover, different delisting strategies and subsequent development on these markets suggest that the decisions of the stock exchange authorities are crucial for further functioning of the market.

Table 3.4: Logit model for the Czech and Slovak Republics (y=1 for delisting)

LOGIT ESTIMATION	Results		Interpretation	
Pre-privatization factors	Estimated coefficient	Standard Error	dP/dX	one SD effect
Total number of shares (millions of shares)	-0.194 **	0.082	-0.023	-0.036
Profit before privatization (scaled by book value)	-0.010	0.015	-0.001	-0.005
Privatization factors				
Average price in voucher auction (in points)	-0.003 ***	0.001	-0.0004	-0.021
National property fund ownership dummy	-0.357 **	0.182	-0.043	
Foreign owner ownership dummy	-0.937 ***	0.362	-0.112	
Post-privatization factors				
Operational profit growth	-0.008 **	0.004	-0.001	-0.024
Total debt growth	0.005 *	0.003	0.001	0.018
Slovak dummy variable	-1.425 ***	0.226	-0.170	
Constant	2.464 ***	0.145	0.294	
Number of observations	1 476			
Scaled R^2	0.055			

Note: The table contains estimation results for the logit model. We report estimated coefficients, their significance (* significant at 10%, ** significant at 5% and *** significant at 1%) as well as marginal effects (dP(y=1)/dX).

3.7 Conclusion

Similar to the Czech Republic, the Slovak stock market has experienced a rather big wave of delisting. This happened despite the fact that the second privatization wave did not materialize in Slovakia. The majority of companies was delisted only in the year 2002, five years later than in the Czech Republic. Our examination uncovers, that variables connected to privatization play an important role in this process and based on them it was

possible to identify companies that were going to be delisted even before the actual delisting took place.

Using the Czech and Slovak connection we point out that despite the same initial conditions, their stock markets have developed in a different way after the companies privatized under the mass privatization scheme entered them. This seems to be the result of significantly different strategies adopted by the PSE and the BSSE. This result points out a crucial role that authorities play in the development of the emerging stock markets.

REFERENCES

Bačišin V. (2002):"Kapitálový trh," In Macinčin A. (eds.): *Hospodárska politika na Slovensku 2000 – 2001*, Slovenská spoločnosť pre zahraničnú politiku.

Barto M., Kmeť T. (2000): "Bankový sektor v Slovenskej republike," In Marcinčin A., Beblavý M. (eds.): *Hospodárska politika na Slovensku 1990 – 1999*, Centrum pre spoločenskú a mediálnu analýzu, Výskumné centrum Slovenskej spoločnosti pre zahraničnú politiku a INEKO – Inštitút pre ekonomické a sociálne reformy.

Bratislava Stock Exchange Factbooks (1996 – 2004)

Gajdzica M., Jakoby M., Morvay K., Pažitný P. (2002): "Celkový ekonomický vývoj," In Kollár M., Mesežnikov G. (eds.): *Slovensko 2002: Súhrnná správa o stave spoločnosti*, Inštitút pre verejné otázky, Bratislava.

Hanousek J. (2000): "Testing of (non-nested) Choice Models via Accuracy of Prediction: A Non-Parametric Approach," *Central European Journal of Operations Research* 8: 259 – 264.

Hospodarske noviny (2006): "The Volume of Trades with Shares is Thousand Times Higher on the Prague Stock Exchange than on the Bratislava Stock Exchange. Czechs are trading, Slovaks still not (Objem obchodov s akciami na pražskej burze je tisíckrát väčší ako na bratislavskej. Česi obchodujú, Slováci stále nie)," July 25.

Marcinčin A., Beblavý M. (eds.), (2000): *Hospodárska politika na Slovensku 1990 – 1999*, Centrum pre spoločenskú a mediálnu analýzu, Výskumné centrum Slovenskej spoločnosti pre zahraničnú politiku a INEKO – Inštitút pre ekonomické a sociálne reformy.

OECD (2002): Economic Survey of Slovak Republic, Vol. 2002/11.

Trend (2006): "Capital Market Was Not Awaken by Economic Growth (Kapitálový trh nezobudil ani svižný hospodársky rast)," June 26.

Vlkolinský R. (2005): "Ročná správa o hospodárení spoločnosti," Profit (16.5.2005)

APPENDIX 3

**Table A3.1:** The main stock market indicators from the BSSE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of share and unit issues	512	523	850	970	918	833	830	866	888	510	452	389	306	256
of that listed	11	19	21	21	14	14	11	10	12	15	14	14	13	10
of that unlisted	501	504	829	949	904	819	819	856	876	495	438	375	293	246
Total turnover (bil of SKK)	0.2	6.3	40.1	114.1	164.1	299.1	188.4	255.5	393.5	643.2	1096.7	432.3	1001.9	992.1
Turnover of shares and units (bil. of SKK)	0.1	5.4	24.7	83.1	82.7	37.3	20.2	25.1	45.8	34.9	24.4	21.4	2.1	2.6
% of share and unit in total turnover	53.7	86.4	61.7	72.8	50.4	12.5	10.7	9.8	11.6	5.4	2.2	4.9	0.21	0.26
% of negotiated deals in turnover of shares and units	79.5	85.6	98.4	91.1	97.2	94.8	91.3	92.6	94.8	97.0	93.4	60.2	79.8	52.4
Market cap. of shares and units (bil.of SKK)	93.8	97.4	158.3	184.1	184.1	152.0	150.8	154.9	167.6	105.0	110.9	140.1	151.7	153
Real market capitalization of shares (% of GDP)			12.3	12.8	11.5	6.7	6.0	6.6	7.8	6.9	7.5	9.5	9.6	9.2
Total market capitalization (% of GDP)			30.6	32.0	28.1	21.2	18.5	17.5	16.9	9.6	9.2	10.6	10.3	9.6

Source: Bratislava Stock Exchange

Note: Real market capitalization is market capitalization (MC) of issues which have market price. it does not include nominal value of issues which were traded just in negotiated deals. includes units and shares of investment funds.
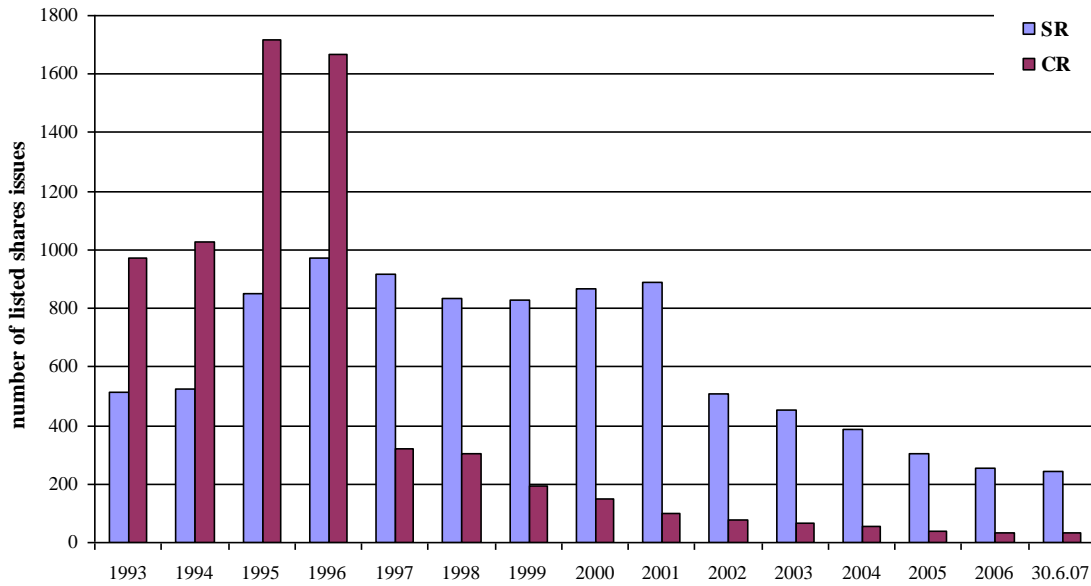Total market capitalization includes nominal MC. real MC and MC of units and shares of investment funds

Figure A3.1: Stock market capitalization in OECD countries (% of GDP in 2000)
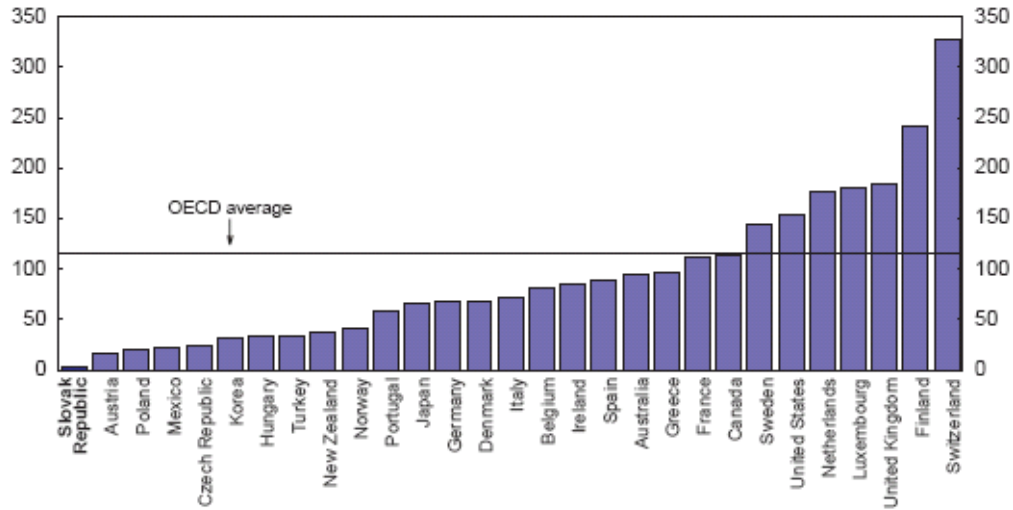
Source: OECD (Economic Survey of the Slovak Republic 2002)

Figure A3.2: Share issues listed on the Bratislava and Prague Stock Exchange
(1993 – 6/2007)

Source: Bratislava Stock Exchange, Prague Stock Exchange

Table A3.2: Pre-privatization descriptive statistics of size

PRE-PRIVATIZATION: SIZE	Difference between emloyees one and three years before privatization				Total number of shares			
Subgroup/Indicator	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	307	193	348	75	382	210769	913409	57020
Not-delisted	100	214	390	94	114	292668	1097164	71006
REASONS								
Delisted by authority	14	176	326	78	22	83773	178171	24902
Delisted by issuer	86	180	292	66	112	331444	1604496	51168
Information obligation	207	199	371	82	248	167536	342647	61626
TIME								
Delisted before 2002	22	231	288	120	35	122835	216297	34666
Delisted in 2002	171	213	396	82	201	184668	379817	65094
Delisted after 2002	114	154	272	55	146	267782	1405775	52703

Table A3.3: Pre-privatization descriptive characteristics – financial variables

PRE-PRIVATIZATION: FINANCIAL VARIABLES	Difference between sales three and one year before privatization				Profit one year before privatization (% of total number of shares)			
Subgroup/Indicator	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	301	-110673	1573684	4644	379	0.086	0.264	0.044
Not-delisted	89	8347	201416	1266	113	0.113	0.174	0.069
REASONS								
Delisted by authority	13	-12270	168814	6636	22	0.215	0.616	0.036
Delisted by issuer	86	-339363	2924906	8841	112	0.096	0.177	0.060
Information obligation	202	-19642	213047	3446	245	0.070	0.244	0.032
TIME								
Delisted before 2002	21	13681	156382	21413	35	0.14	0.49	0.04
Delisted in 2002	167	-21677	229218	4287	198	0.08	0.26	0.03
Delisted after 2002	113	-265307	2551932	3426	146	0	0	0.05

Table A3.4: Descriptive characteristics of privatization variables I

PRIVATIZATION CHARACTERISTICS I	Number of shares in voucher priv. (% of total number of shares)				Average price in the first privatization wave			
Subgroup/Indicator	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	382	90	17	97	382	31	33	23
Not-delisted	114	86	20	97	114	37	54	30
REASONS								
Delisted by authority	22	92	15	97	22	45	36	42
Delisted by issuer	112	90	17	97	112	37	36	32
Information obligation	248	90	17	97	248	27	31	21
TIME								
Delisted before 2002	35	95	14	97	35	34	30	31
Delisted in 2002	201	90	17	97	201	28	33	21
Delisted after 2002	146	90	17	97	146	34	34	30

Table A3.5: Descriptive characteristics of privatization variables II

PRIVATIZATION CHARACTERISTICS II	Proportion of shares held by the National Property Fund				Proportion of shares held by foreign investors			
Subgroup/Indicator	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	382	3.60	11.57	0	382	0.58	5.87	0
Not-delisted	114	7.24	16.02	0	114	1.51	8.19	0
REASONS								
Delisted by authority	22	1.32	6.18	0	22	0	0	0
Delisted by issuer	112	4.41	13.66	0	112	0.99	8.08	0
Information obligation	248	3.44	10.89	0	248	0.44	4.87	0
TIME								
Delisted before 2002	35	0	0	0	35	2.29	13.52	0
Delisted in 2002	201	3.25	10.80	0	201	0.55	5.40	0
Delisted after 2002	146	4.95	13.62	0	146	0.21	2.57	0

Table A3.6: Descriptive characteristics of post-privatization variables

POST-PRIVATIZATION CHARACTERISTICS	Growth rate – potential profit (based on operational profit between 1996 and 1997)*				Growth rate – debt (based total debt between 1996 and 1997)*			
Subgroup/Indicator	NOB	Mean	Std. Dev.	Median	NOB	Mean	Std. Dev.	Median
Delisted	382	-27.0	28.5	-31.1	382	48	51	56.9
Not-delisted	114	-22	32.9	-26	114	40.1	55.8	23.1
REASONS								
Delisted by authority	22	-31.3	9.7	-36	22	48.3	19.6	56.9
Delisted by issuer	112	-25.0	32.0	-27.9	112	45.7	59.6	28
Information obligation	248	-27.6	28.0	-33.8	248	49.2	49.3	56.9
TIME								
Delisted before 2002	35	-28.5	23.8	-36.4	35	47.8	17	56.9
Delisted in 2002	201	-30.1	25	-36.4	201	47.2	42.7	56.9
Delisted after 2002	146	-22.4	33.6	-26.7	146	49.4	65.9	34.2

*Note: Both growth indicators are calculated as the growth rate between the current and the following year of average value in a given industry, excluding the company itself.

Table A3.7: Definitions and data sources of the variables included in the analysis

VARIABLE NAME	SOURCE	DESCRIPTION
Employees	Ministry of Privatization of the Czech Republic	number of employees in the company before privatization
Total number of shares (tns)	Ministry of Privatization of the Czech Republic (MP CR)	the total number of shares of a firm i.e. capital of a firm divided by the value of one share (1000)
Profit (p3, p2, p1)	MP CR	profit prior to privatization (three, two and one year)
Average price (AP)	Ministry of Privatization of the Czech Republic	average price of the firm's shares sold in the auctions; sold points divided by shares sold
Number of shares in mass priv. (NSCP_TNS)	Ministry of Privatization of the Czech Republic	the number of shares offered in the coupon privatization as % of total number of shares
Shares held by the National Property Fund	Ministry of Privatization of the Czech Republic	% of shares that should based on the privatization project be kept by the NPF
Shares held by foreign investors (for)	Ministry of Privatization of the Czech Republic	% of shares that should based on the privatization project be sold to a foreign investor
Single largest owner (slo)	Central Securities Depository of the Slovak Republic	% of shares owned by the single largest owner at the end of 1995
Operational profit (1995 - 2000)	INFIN database, supplemented by AMADEUS	operational profit defined by the Slovak accounting standards, row 29 in the profit and loss account
Total debt (1995 - 2000)	INFIN databaase	total debt defined by the Slovak accounting standards, row 86 of the in the balance sheet

Note: Ministry of Privatization of the Czech Republic was the successor of the Ministry for Privatization of the Czechoslovak Federative Republic

Table A3.8: Results of the McNemar-type test (observed frequencies and χ^2)

		OUR MODEL		
	outcome	Incorrect	Correct	Σ
NAIVE ESTIMATOR	Incorrect	15	98	113
	Correct	10	369	379
	Σ	25	467	492

Note: Both models predict correctly 369 delisted companies and 15 that stayed, however our model was in comparison to the naive estimator mistaken only ten times, while the naive estimator incorrectly predicted 98 cases. This indicates the prediction power of our model that is also confirmed by the test statistic

$$\chi^2 = \frac{(n_{12} - n_{21})^2}{n_{12} + n_{21}}$$ that has an asymptotic χ^2 distribution. Its value is 71.704 which makes our results significant at all levels.