

# The Impact of Mutual Funds on the Slovenian Stock Market

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## Abstract

In this paper we analyze the impact of PIDs (Authorized Investment Companies) on the equity market of the Ljubljana Stock Exchange (LJSE) in the period 1996-1999. PIDs, the Slovenian version of the closed-end mutual funds, are growing in terms of asset size and in their presence on the equity market. Our analysis of the ownership structure shows that the shareholdings of PIDs in the Slovene companies are also increasing. Using a set of empirical measures of market liquidity, we find some evidence that PID shareholdings negatively affect the liquidity of shares on the LJSE.

# 1 Introduction

Motivated by recent empirical literature on the impact of institutional investors on the stock market liquidity, and by the theoretical literature on the importance of institutional shareholdings for the effective corporate governance, this paper presents one of the first attempts to analyze the impact of institutional investors on the Slovenian equity market. We study the impact of closed-end funds (PIDs) on the organized equity market of the Ljubljana Stock Exchange (LJSE) in the period 1996-1999. We study this particular period because Slovenia had no PIDs in place before 1994.<sup>1</sup>

PIDs (the Slovenian abbreviation for Authorized Investment Companies) are the Slovenian version of closed-end mutual funds. They were created as a part of the process of the abolishment of social ownership ('privatization').<sup>2</sup> Consequently, they have some specific 'transitional' features that are supposed to vanish gradually, until PIDs resemble some standard type of financial institutions. Their most important transitional feature are ownership certificates (vouchers), for which PIDs were initially 'selling' their shares. Subsequently, PIDs exchanged these certificates for the shares of privatizing companies. PIDs are a frequent subject of policy debates in Slovenia, with the latest one focused on their optimal future organizational form.<sup>3</sup>

We focus on PIDs because the open-end funds are too small to have any impact on the stock market. Their net asset value represents less than 2% of total asset value of PIDs. The impact of other non-bank financial institutions, like insurance companies and pension funds, is hard to evaluate. Private pension funds do not exist yet, and the status of the majority state owned insurance companies has not been resolved. We have to exclude foreign mutual funds from our analysis due to the lack of data.<sup>4</sup>

The paper seeks answers to the following questions: How important are mutual funds within

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<sup>1</sup>In many respects, 1994 is a turning point for the Slovenian capital market. In that year the Securities Market Agency was established as the official supervisor of the Slovenian securities market, and the Law on investment funds and management corporations was passed.

<sup>2</sup>Slovenian 'mass privatization' can hardly be described as privatization in its usual sense, mostly because of the existence of social, not state ownership in the period before 1992. Social ownership was a non-ownership concept, which attempted to replace market mechanisms with societal agreements and self-management contracts (Bohinc and Bainbridge (1999)). Firms were run by directors (executive managers) and controlled by the worker's councils. The use of a more appropriate term 'abolishment of social ownership' was suggested by Ribnikar (1998).

<sup>3</sup>According to the Law on Investment Funds and Management Corporations of 1994 (Official Gazette of the Republic of Slovenia, 6/94), the authorized investment companies have to transform into regular investment companies in 5 years. In an amendment to this law of March 1999, this period was extended to March 13th, 2000 if PIDs want to transform into the holding companies. For transformation into regular corporations, or regular open or closed-end mutual funds the new deadline is July 13, 2002. Lukovac (1999) provides an overview of the issues regarding the future legal form of PIDs and their transformation.

<sup>4</sup>According to the Bank of Slovenia (Financial Markets, November 1999.), foreign investors accounted for 14.5% of total equity trading volume on the Ljubljana Stock Exchange in 1996. Their share increased to 27.5% in 1997 and dropped to 10% in 1998. In the first eight months of 1999 trading volume of foreign investors represented only 1.3% of the total trading volume of all shares. About two thirds of all foreign trading in LJSE is done by institutional investors, followed by corporations and individuals. Because foreigners so far traded almost exclusively the shares of a few Slovenian blue-chip companies (like the pharmaceuticals Krka and Lek), it seems reasonable to assume that they do not have a significant impact on the rest of the market.

the Slovenian financial sector? What can the portfolio structure of funds and the ownership structure of Slovenian companies tell us about the potential impact of mutual funds on the equity market? How important are PID shares for the LJSE? What is the impact of ownership concentration on the liquidity of the LJSE traded shares?

We show that PIDs own an increasing number of Slovenian companies. We find some evidence that trading volume of shares of listed PIDs have influenced the trading volume of non-PID shares on the LJSE, and its volatility. Our main result suggests that the cumulative blockholdings of large investors and the shareholdings of PIDs have a negative impact on the liquidity of listed shares in years 1997-1999.

Our paper builds on the empirical literature on the aggregate impact of mutual funds on equity market (see Warther (1995), Mosebach and Najand (1999), Edelen and Warner (1999), etc.), and on the corporate governance literature on the liquidity-control trade-offs. The work of Maug (1998) and Bolton and von Thadden (1998) provides theoretical grounds for our empirical analysis of the impact of ownership concentration on the liquidity of the stock market. According to Bolton and von Thadden (1998), market liquidity may be positively correlated with blockholdings, even though the latter decrease the free float of shares. Namely, blocks of shares in the hands of one (or more) large shareholder(s) cannot be built without sufficient liquidity of the market. Becht (1999), however, finds a significant negative relationship between market liquidity of a sample of German and Belgium stocks, and the cumulative blockholdings of large shareholders in these same companies. Similarly, we find evidence that PIDs, who can be considered large shareholders in Slovenia, also have a negative impact on the liquidity of the Slovenian stock market. Although interesting, the issue of Slovenian institutional investors and control goes beyond this paper.

PIDs have been studied in the Slovenian academic literature before, but the focus of these studies was different from ours. Ribnikar (1998) emphasizes their (primarily) negative impact on the savings rate within the Slovenian economy, and suggests ways in which their role in the process of the abolishment of the social ownership can be neutralized by facilitating the reform of the pension system. Žnidaršič-Kranjc (1998) evaluates the performance of PIDs in the first five years of their operations, and provides economic and political reasons for their unfavorable results. By providing empirical evidence on the effects of PIDs (and open-end funds) on the Slovenian stock market we add another dimension to the existing literature on mutual funds in Slovenia.

The paper is organized as follows. In the next section we shortly describe the equity market of the LJSE. In Section 3 we illustrate the size, relative importance, and the portfolio structure of mutual funds, with the focus on PIDs. Section 4 brings the analysis of the ownership structure of Slovenian corporations. Section 5 is the main part of the paper, with a quantitative analysis of the impact of PIDs on the stock market and its liquidity. Section 6 concludes.

Table 1: Trading volume, market capitalization and the number of securities traded on the Ljubljana Stock Exchange, 1992-1999.

	1992	1993	1994	1995	1996	1997	1998	1999
Market capitalization (Mln USD)	337.9	476.8	597.7	799.3	1252.4	2360.5	4406.0	4673.9
Trading volume (Mln USD)	167.1	770.3	875.9	743.3	642.7	678.2	1043.6	1461.3
Market turnover ratio	0.5	1.6	1.5	0.9	0.5	0.3	0.2	0.3
Number of securities traded	25	33	31	49	82	129	173	237

Source: Ljubljana Stock Exchange and the Bank of Slovenia.

## 2 Slovenian equity market

The Slovenian financial markets started to develop simultaneously with the reforms of the economic system in the years 1988/89. Slovenia needed a well organized, transparent and liquid capital market, which would operate with low costs, stimulate the development of financial services sector and direct the increasing flows of capital into productive investments (Mramor (1996)). Such a market was also needed to facilitate some of the phases in the process of the ownership restructuring of the Slovenian corporate sector, although it wasn't a precondition for its start-up.

The process of 'privatization' of social ownership had a strong impact on the organization of the LJSE. It also brought along a lot of new securities and new capital market participants (like PIDs, for example). The shares of 'privatized' companies and shares of PIDs attracted a lot of interest, and they represent a significant part of the trading volume of the LJSE listed shares.

In Table 1 we show the total market capitalization, total trading volume and total number of securities traded on the LJSE, including shares, corporate and government bonds and the short terms securities of the central bank (Bank of Slovenia).<sup>5</sup> While the total market capitalization and the number of traded securities increased monotonically in the period 1992-1999, the trading volume didn't. The drop in the total trading volume in 1996 was more than recovered by 1998, when total trading volume and market capitalization of exchange increased due to the introduction of privatization shares and the shares of PIDs. The increase in market capitalization was not accompanied by the corresponding increase in trading volume of privatization and PID shares. This shows in the decreasing total market turnover (trading volume divided by market capitalization), which implies that the stock exchange as a whole has become increasingly illiquid. A slight recovery in market turnover is observed in 1999, however. A similar trend is observed for the equity market alone (see Figure 2).

The number of shares traded on all three market segments of the LJSE, i.e. *Market A*, *Market B* and *the free market* in Table 2 shows that privatization shares contributed to the recent

<sup>5</sup>Trading volume is single counted. We use the average USD/SIT exchange rate during the year for the conversion of the trading volume from SIT to USD, and the end-of-year exchange rate for the conversion of market capitalization into USD. Both exchange rates are provided by the Bank of Slovenia (Monthly Bulletin, January 2000).

Table 2: The number of shares traded on different segments of the LJSE, 1992-1999.

	1992	1993	1994	1995	1996	1997	1998	1999
A and B Market	2	0	2	18	25	30	29	30
Free Market	6	16	17	9	27	55	93	150
- of which mutual funds (PIDs)	-	-	-	-	-	-	(30)	(46)
All shares	8	16	19	27	52	85	122	180
- of which non-PID privatization shares	-	-	-	-	(29)	(61)	(73)	(115)

Source: Ljubljana Stock Exchange.

increase in the size of the stock exchange.<sup>6</sup> In addition to the LJSE, shares can also be traded on the *unorganized*, or *off-exchange market*. There, PIDs and three state privatization-related funds trade shares for other shares, ownership certificates, cash or for real estate.<sup>7</sup> Shares from internal purchases and internal equity distribution, and partly transferable shares are also traded on this market.

In Figure 1 we plot the share of the equity market in the total trading volume and market capitalization of the exchange. The graph suggests an increasing relative importance of the equity market within the LJSE in the last decade. In 1992, the stock exchange could more appropriately be characterized as a marketplace for bonds, as the trading volume of shares accounted for less than 5% of the total turnover of the exchange. The share of stocks in the total market capitalization was similarly low. From 1996 on, the market for shares has strictly dominated other segments of the LJSE in terms of trading volume and market capitalization.<sup>8</sup>

Although the market capitalization of shares grew fast during the period 1992-1999, it remained small relative to the GDP. It accounted for less than 2% of GDP in years 1993-1995, but increased substantially in years 1996-1997, when it was 4.9% and 10.9%, respectively. At

<sup>6</sup>Due to the simple admission procedure and the fact that trading with shares can start as soon as they are registered in the central depository, most of the shares of privatized companies are currently being traded on the *free market*. Securities, which have been successfully publicly offered, or whose further public sale has been approved by the Securities market Agency (Agency), and meet strict listing requirements of the LJSE, can be listed on *Market A* and *Market B*. The listing requirements for *Market A* are more stringent. The *Free market*, called the *OTC market* is a segment of the organized securities market for which the securities don't have to meet the exchange listing requirements.

<sup>7</sup>With privatization-related funds we mean the Restitution Fund, the state Pension Fund and the Development Fund. According to the Law on the ownership transformation of business enterprises (1992), the Development fund, the Restitution fund and the state Pension fund received 20%, 10% and 10% of shares of each 'privatized' firm, respectively. The Slovenian Development Fund (transformed into the Slovenian Development Corporation in 1997) started as a state fund, whose goal was to restructure the companies in its portfolio, arrange project financing and foster technological development. The Development fund also organizes the auctions of the 'privatization' shares. The restitution fund is another state fund that participated in the distribution of shares of privatizing companies by law. Its assets should enable it to cover the claims of individuals (or their ares), whose assets were illegally taken away from them after the Second World War.

<sup>8</sup>Most of the trading with shares still takes place on the exchange. However, the off-exchange trading volume of all securities accounted for almost 50% of the total LJSE trading volume in the first three quarters of 1999 (Finančni trgi, November 1999). The structure of off-exchange trades is rather different. The proportion of trades with shares is much smaller, and the proportion of trades with bonds much larger than in case of transactions that take place on the exchange.

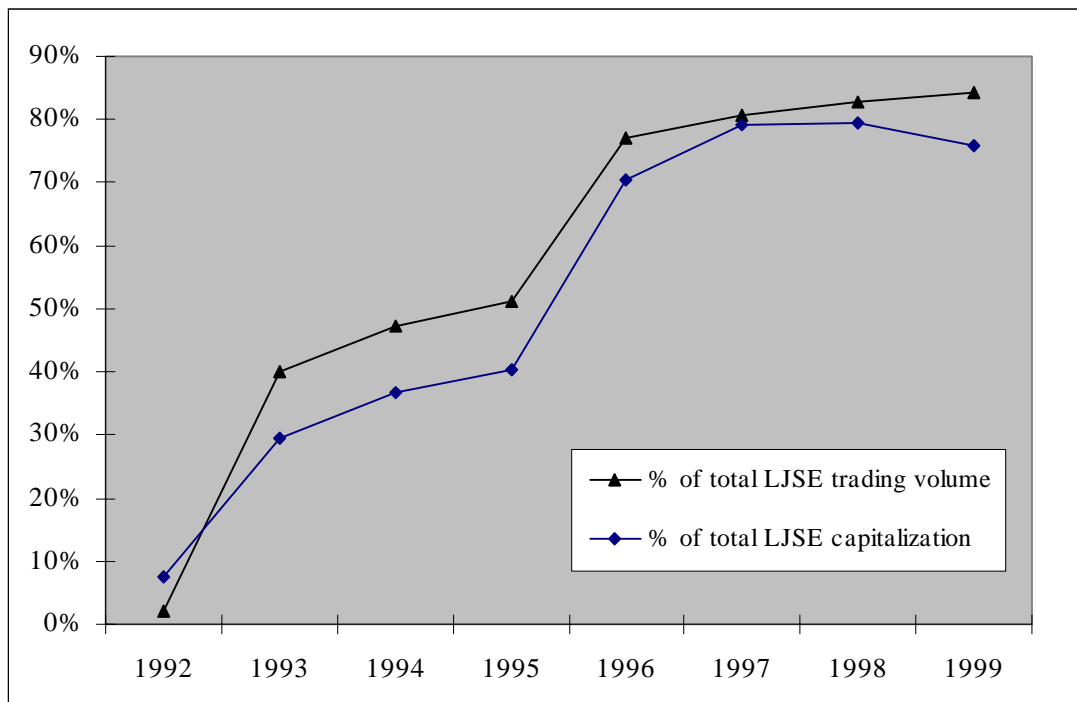


Figure 1: *The relative importance of the market for shares within the LJSE in years 1992-1999, measured as the percentage contribution to the total trading volume and market capitalization of the LJSE. The totals include bonds, T-bills, etc.*

the end of 1998, the equity market capitalization already accounted for 17.4% of GDP.<sup>9</sup>

The size indicators do not give a complete description of the market. Informational efficiency is one additional market property that should be considered. Some recent empirical research suggests that the LJSE equity market is not even weak-form efficient: there is significant autocorrelation in daily stock prices and returns, market returns do not behave like a random process, etc.<sup>10</sup> Low market liquidity might explain some of these properties. It might also explain why, despite its growth, the organized equity market remains a relatively unimportant source of capital for Slovenian corporations.<sup>11</sup> Empirical evidence shows that the most important sources are internal funds and bank loans.<sup>12</sup> Illiquid stock market could make equity too expensive for the firms. If market liquidity is low, the investors require higher liquidity premiums, and the cost of capital for the firms is higher.

<sup>9</sup>This percentages are comparable to some other transition economies, and some OECD countries like Italy, Austria or Greece. For example, in 1996, the stock market capitalization as a percentage of GDP was 12% in Hungary, 7% in Poland, 26% in Estonia and 39% in the Czech Republic (Financial Market Trends 70, 1998).

<sup>10</sup>See Dezelan (1999).

<sup>11</sup>Veselinovič (1998) discusses the ten most important reasons for why the firms look for capital outside the stock exchange. He mentions securities market regulation, the lack of demand for long-term capital, the negative effects of the supply of shares of the privatizing companies, and others. The cost of issuing and floating shares might be another reason why companies search for capital outside the exchange.

<sup>12</sup>See Krizaj (1999) for the discussion of the importance of bank loans as a source of capital for the Slovene firms.

A very crude measure of liquidity of the Slovenian stock market is the ratio of monthly trading volume of all shares (i.e. shares on A, B and OTC market) over their end-of-month market capitalization. A low value of the ratio means that market liquidity is low. The plot of the ratio for LJSE stock market in Figure 2 suggests a deteriorating monthly market liquidity.<sup>13</sup> The ratio of monthly trading volume to end-of-month market capitalization has been increasing until January 1996, and then dropped significantly. It remained at a low level afterwards, suggesting rather low liquidity. Note that during the same period the corresponding ratio for Hungarian listed stocks was between 50% and 240%.

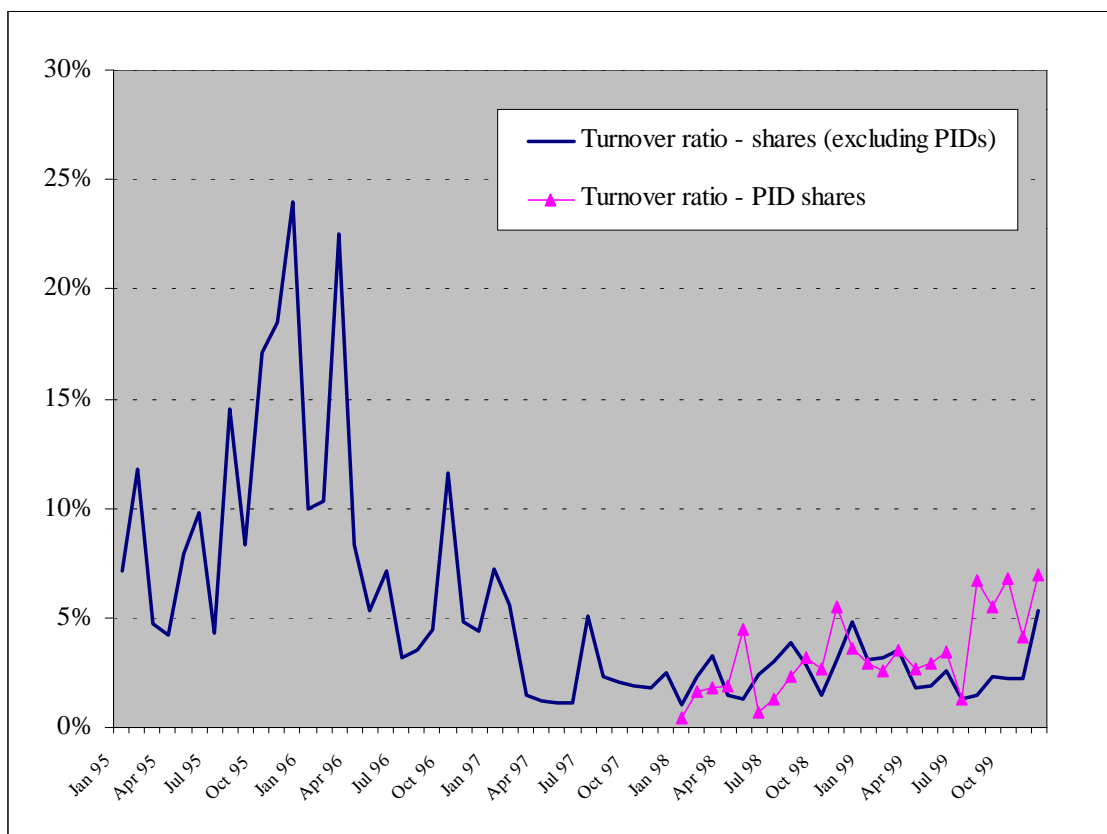


Figure 2: *The ratio of monthly trading volume to end-of-month market capitalization of non-PID shares and PID shares, January 1995 - December 1999.*

The descriptive statistics could lead us to conclude that the privatization shares on average added to the size of the stock market, but not to its liquidity. The introduction of privatization shares substantially increased the equity market capitalization, but it did not contribute much to the total trading volume of the equity market. According to Figure 2, PID shares may have had a similar effect.

<sup>13</sup>The series exhibits a negative linear and exponential trend.

## 2.1 PID shares on the LJSE

In January 1998, shares of the first PIDs became quoted on the free market of the LJSE. We provide a short institutional background of PIDs in Appendix 1. Figure 3 shows how the number of listed PIDs, and the market capitalization of PID shares evolved in time. By the end of 1999, the number of PIDs with shares quoted on the exchange increased to 48. The total market capitalization of PID shares increased accordingly.<sup>14</sup>

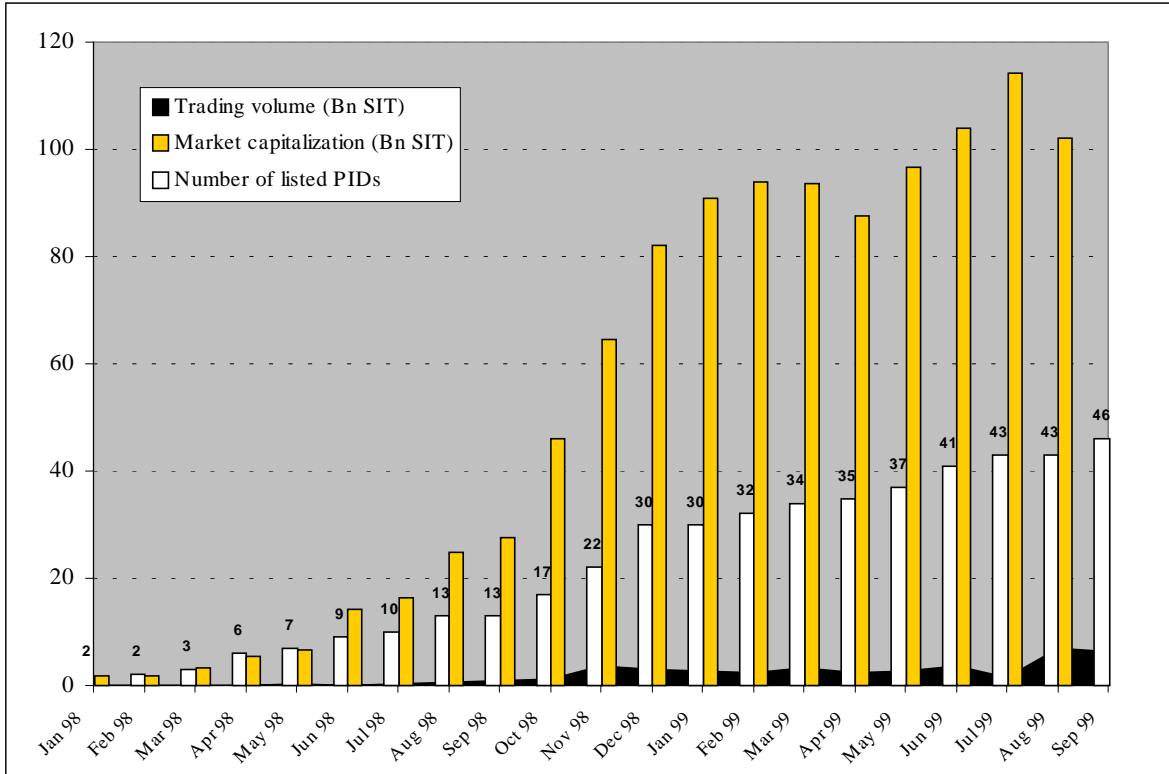


Figure 3: *Market capitalization and trading volume of PID shares, and the number of listed PIDs on the LJSE, 1998-1999.*

The introduction of PID shares to the exchange changed a structure of trading volume of the LJSE. The trade in shares of PIDs added a lot to the overall trading volume of the LJSE in the last two years.<sup>15</sup> The contribution of PID shares to the total trading volume of all shares was increasing fast. From zero percent in January 1998, it grew to 20% in November 1998 and it reached 45% in August 1999. Due to the increasing importance of PID shares on the exchange, the LJSE started publishing a separate price index for PID shares, PIX, in February

<sup>14</sup>The large drop in the market capitalization of PID shares in August 1999 was due to temporary termination of trading with PID shares. In accordance with the new Law on the First pension fund of the Republic of Slovenia and the transformation of the Authorized investment companies (Official Gazette of the Republic of Slovenia, 50/99), shares of PIDs had to be re-denominated and registered with the clearing house anew. Until this process was completed, PID shares were not traded.

<sup>15</sup>In July 1999, for example transactions with PID shares represented 64% of transactions with all LJSE quoted securities (Financial Markets, August 1999).

1999. The relatively high proportion of transactions with PID shares is primarily due to the specific circumstances within the Slovenian financial system. A more active primary equity market could easily divert investors' interest elsewhere.

In section 5 we discuss other dimensions of the impact of PIDs on the stock market. Next, we discuss the size of the mutual fund industry and the portfolio structure of PIDs.

### 3 Slovenian mutual fund industry

The history of Slovenian mutual funds is shorter than ten years. The mutual fund industry is dominated by the closed-end type of funds, or PIDs. Because PIDs today account for almost 99% of the total mutual fund assets, we focus on the impact of PIDs on the Slovenian stock market.<sup>16</sup> We provide a short analysis of open-end funds and their potential impact on the stock market in Appendix 2. In this section we first illustrate the relative size of the mutual fund industry, and PIDs, within the Slovenian financial sector. We then analyze the composition of PIDs' assets to see how large their investment in shares is.

#### 3.1 Size of mutual funds

According to the last available statistics, total assets of mutual funds account for about 17% of assets of the whole financial sector.<sup>17</sup> The figures in Table 3 show that banks, together with savings and loans institutions, dominate the Slovenian financial system in terms of asset value. They hold more than two thirds of all financial sector assets, and their share increased in 1998. Mutual funds are the largest among the non-bank financial institutions, followed by insurance companies and securities brokers. However, the share of mutual funds dropped by more than one percentage point in 1998. Total assets of open-end funds accounted for only 0.1% of the total financial sector asset value at the end of 1998, which indicates that PIDs clearly dominate the mutual fund industry. Note that excluding ownership certificates, the assets of mutual funds together only account for 9% of assets of the whole financial sector. In the absence of private pension funds, mutual funds remain the most important non-bank financial intermediary.<sup>18</sup>

Mutual fund assets represent a monotonically increasing percentage of GDP each year (see Table 4). The total asset value of mutual funds grew to over 20% of GDP in the last year. This percentage is comparable with Switzerland, for example, and considerably more than some other OECD countries, like Poland, Hungary, Turkey or Mexico.<sup>19</sup> PIDs account for

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<sup>16</sup>Excluding PIDs, there are currently no other closed-end funds in Slovenia.

<sup>17</sup>At this moment, the statistics for 1999 are not yet available, so the last ones hold for 1998.

<sup>18</sup>The balance sheet-based statistics may not be the best indicator of the degree of financial intermediation of different financial institutions. As in case of brokers, the size of their intermediation does not show directly in their balance sheet. Although they are much smaller than PIDs in terms of assets, the value of investments intermediated by brokers and PIDs was almost the same at the end of June 1999 (Finančni trg, November 1999).

<sup>19</sup>The value of ownership certificates is included in the assets of the funds in this calculation. The data for

Table 3: Participation of different financial institutions in the total assets of the financial sector, 1997-1998.

	1997	1998
Banks and S&Ls	69.3%	70.3%
PIDs and	17.8%	17.5%
Open-end mutual funds	0.1%	0.2%
Insurance companies	6.5%	7.2%
Leasing companies	2.8%	3.2%
Securities brokers	1.0%	0.6%
Other financial institutions	2.6%	2.1%

Source: Financial Markets, October 1998 and November 1999.

Table 4: Some descriptive statistics on PIDs and open-end funds, 1994-1999.

Year	1994	1995	1996	1997	1998	1999
	<i>PIDs</i>					
Number of PIDs	44	48	64	60	46	46
Total asset value of PIDs (in Bn SIT)	273 <sup>a</sup>	389	455	526	593	599
% of certificates among assets of PIDs	100%	84%	66%	57%	52%	49%
	<i>Open-end funds</i>					
Number of open-end funds	18	18	15	15	15	17
Total value of open-end fund assets (in Bn SIT)	3.8	6.5	2.3	2.8	4.5	8.8
	<i>Mutual funds together</i>					
Total mutual fund assets as a % of GDP	14.7%	17.5%	17.9%	18.1%	18.3%	23.3% <sup>b</sup>

<sup>a</sup>Only total equity value of PIDs available for 1994.

<sup>c</sup>The estimate is based on the assumption that GDP in the last quarter of 1999 grew at the same rate as in the third quarter.

Source: Bank of Slovenia and Securities Market Agency.

most of this growth.

In Table 4 we provide some data on the size of PIDs and open-end funds. To give an indication of the relative importance of PIDs, we also include the percentage of PID assets in the total financial sector assets in the table. We see that the number of PIDs is much larger than the number of open-end funds. The sharp decrease in the number of PIDs between 1997 and 1998 was mainly due to restructuring. The larger Authorized management corporations merged the assets of funds under their management. The only decrease in the number of open-end funds was due to the first large capital market manipulation involving mutual funds, which took place in 1996. Four funds took part in the illegal dealings of shares, all managed by the same company. The licence of the management company for dealing with securities was revoked, and most of the assets of the involved funds were transformed into claims on the

the OECD countries is provided in Financial Market Trends 72 (February 1999).

holding company, to which the management company in question belonged.<sup>20</sup> This resulted in a large drop in the total value of open-end fund assets, relative to their 1995 value. Overall, it is believed that a lot of trading volume of shares in 1996 took place with the purpose of price manipulations. In this way, it affected the overall equity market.

Clearly, PIDs are the dominating type of mutual funds in terms of number and asset value.<sup>21</sup> At the same time, almost half of the assets of PIDs is still comprised of ownership certificates. If PIDs exercise their legal option to become open-ended, and exchange the remaining ownership certificates for shares in the near future, they could operate more like conventional mutual funds.<sup>22</sup> As passive shareholders and active portfolio managers, 'open-ended PIDs' could have a larger impact on the organized equity market. Note that the LJSE-traded shares already represent the largest part of portfolios of existing open-end funds. This is not the case with PIDs yet, as we will see next.

### 3.2 Portfolio composition of PIDs

The portfolio structure of mutual funds is partly regulated. The restrictions on the relative size of different asset categories are determined by the Law on investment funds and management corporations of 1994. According to this law, PIDs can invest at most 10% of their assets in securities of the same issuer and his related companies.<sup>23</sup> In addition, a PID can own at most 20% of the shares in an individual company that is in business relation with legal bodies that own more than 10% of the shares of the Authorized management corporation that manages it. PIDs can also invest up to 10% of their assets in foreign securities, if these are traded on one of the exchanges that the Securities Market Agency (Agency) approves.

In Figure 4 we present the composition of PID portfolios graphically. For clarity, only the most important asset categories are distinguished. Shares are the largest asset category of PIDs, if we exclude ownership certificates. The percentage of ownership certificates among PID assets decreased from 84% to 49% in five years. This drop comes primarily at the expense of the increasing proportion of shares in PIDs' portfolios. Excluding ownership certificates, shares represented 92% of PIDs' assets at the end of 1999. About 2% of the total assets was in short-term securities, and the rest in bonds, bank deposits and other assets. The data on the portfolio structure of individual PIDs, kindly provided by the Agency enables us to study the composition of PIDs' assets in more detail.

Our dataset covers 12 quarters, starting with the third quarter of 1996 and ending with the second quarter of 1999. For each quarter, the Agency provided a detailed structure of assets of totally 97 mutual funds. We include only funds, for which we have at least six quarters

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<sup>20</sup>The rest of the assets were put under the management of another company as two new funds.

<sup>21</sup>This may change in case that most of PIDs decide to transform into the open-end type of mutual funds. At the moment, this issue is not resolved yet.

<sup>22</sup>In their prospectus, most of the PIDs that listed their shares on the LJSE expressed the intention to operate either as a regular closed-end fund, or as a holding company in the future.

<sup>23</sup>The Law on investment funds (1994) distinguishes among PIDs and the regular closed-end funds. PIDs are supposed to be a temporary institution that will transform into either a holding company or a regular closed-end fund. For the 'regular' closed-end mutual funds the maximum investment in individual company is higher, 15%. However, PIDs are currently the only 'closed-end' funds in place.

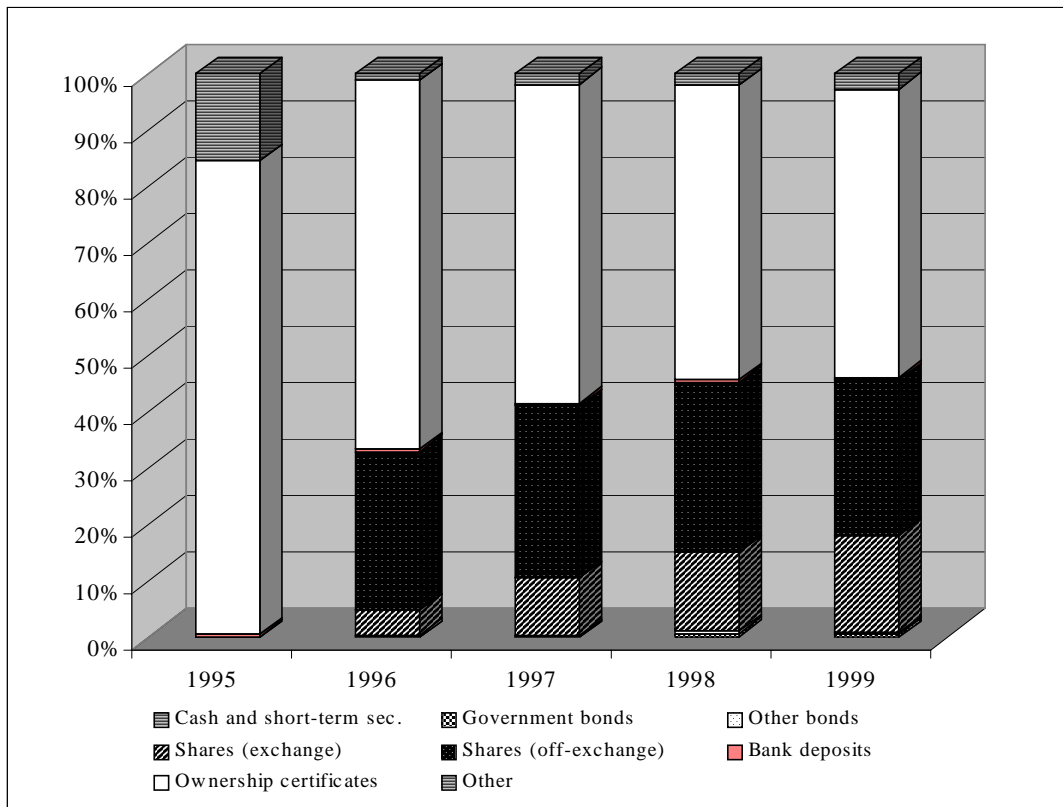


Figure 4: *The end-of-year composition of PID assets in the period 1995-1999.*

of data available. Using this criterion we have to drop 24 investment funds that were either established after March 1998 (10 funds), or stopped their operations by September 1997 (14 funds). This leaves us with 73 funds, of which 15 are open-ended, and with 757 fund-quarters of data.

The summary (panel data) statistics show that the total asset value of an average PID in our sample is 8.43 billion SIT. Without ownership certificates the average size drops to 3.55 billion SIT. An average PID has 40.2% of assets invested in shares (excluding ownership certificates, this percentage increases to 92.3%). In addition, an average PID has only 1% of assets invested in bonds, 0.7% in cash and deposits, and 0.1% in short-term securities. Other less important asset categories make up for the rest.

The mean percentage of PID assets in shares has been increasing since 1996.<sup>24</sup> In the last six quarters of the sample, this proportion is significantly higher than in the quarters before, if we include ownership certificates. We also observe that larger PIDs on average invest a higher percentage of their assets in shares than smaller PIDs. Furthermore, an average PID has only 25% of non-certificate assets in stocks that were purchased on the exchange. 67% of its assets are in the shares that were bought off-exchange. The high percentage of non-exchange listed

<sup>24</sup>See also Financial Markets (November 1999).

shares among the assets of an average PID is not surprising. The shares that PIDs initially acquired either from the Development Fund, other PIDs, or the two privatization-related state funds, were not listed on the exchange. Some of these shares became listed later on, but not all. If PIDs decide to open, i.e. to transform into open-end funds, it would be reasonable to expect that the relative share of listed shares in their assets will come closer to the one of the open-end funds today.

Because it is only a matter of time, when PIDs will exchange all their certificates for shares, we can expect that the proportion of shares among PID assets will increase even further. As almost pure equity funds they might have an influence on the liquidity of shares in their portfolios. Their influence of PIDs depends primarily on the number of shares they hold in each company. For this reason, we look at the ownership structure of the Slovenian firms in the next section.

## 4 Ownership structure of Slovenian firms

The composition of shareholders and the size of their ownership stakes can play an important role in the determination of liquidity of the markets for corporate shares. For this reason, we look at the ownership structure of Slovenian corporations in more detail. First, we look at who the owners are. Then, we look at the ownership dispersion of the exchange-listed firms and the non-listed firms. We conclude the section with a discussion of how important PIDs are as owners of listed and non-listed companies.

Figure 5 illustrates the composition of shareholders of all the companies that were registered with the Clearing and Depository Company (KDD) in years 1998-1999. On the vertical axis are the various groups of investors that hold equity. The percentages on the horizontal axis represent the proportions of the total market value of equity of registered companies held by a particular group of shareholders.<sup>25</sup> KDD keeps records of the securities owners of all dematerialized securities. Its central registry includes securities traded on organized securities market, freely transferable securities not traded on the organized market and securities that have not been publicly offered. Only some of the registered companies have their shares listed on the exchange.

According to the aggregate ownership structure in Figure ??, state and households are the two largest groups of shareholders of the Slovenian corporations.<sup>26</sup> *Non-financial corporations* and *other financial intermediaries* (including PIDs) follow with significantly smaller, and slowly decreasing ownership stakes.<sup>27</sup> The shareholdings of non-bank financial intermediaries have

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<sup>25</sup> When the market value of a share is not available, KDD uses its book value.

<sup>26</sup> Note that state is primarily represented by The Slovenian Development Corporation, The Restitution fund and the Capital fund of the state Pension and health insurance fund. According to the Slovene 'mass privatization' program, the two state funds should on average own about 20% of equity of all 'privatized' companies.

<sup>27</sup> *Other financial intermediaries* include mutual funds (PIDs and open-end funds), investment management companies, leasing and factoring companies and others. The stock exchange, the commodities exchange, clearing house (KDD), brokerage houses and (currency) exchanges are the largest among *auxiliary financial services*.

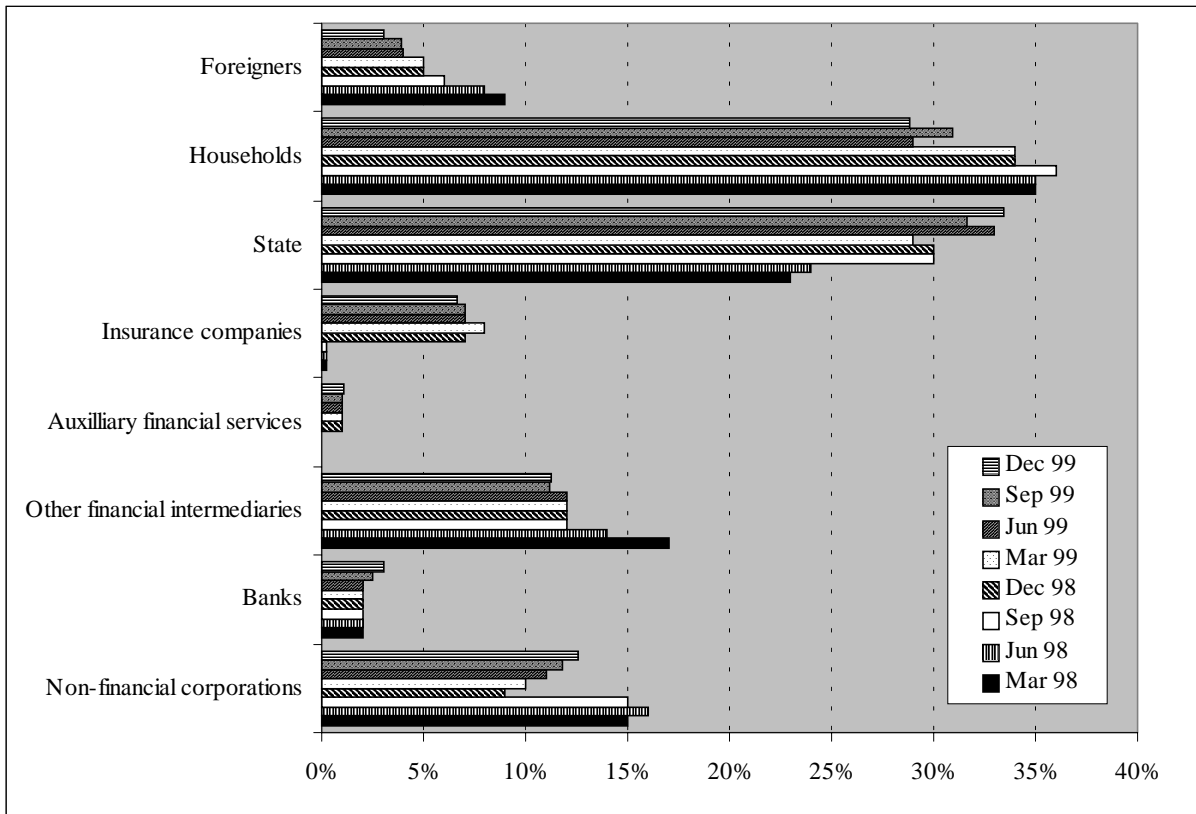


Figure 5: Quarterly ownership structure of Slovenian firms that are registered with the Clearing and Depository House (KDD), 1998-1999. Source: *Finančni trgi 1998, 1999*.

decreased from 17% to 11% in fifteen months. Insurance companies can not be considered large shareholders until the fall of 1998. Subsequently, a few 'recapitalization' equity issues that were mostly bought within the insurance industry increased the overall stake of insurance companies. Furthermore, the state is increasing its ownership in the corporate sector, while the relative share of foreigner investors is decreasing steadily.

Prašnikar et al. (1999) provide another perspective on the ownership structure of the Slovenian companies. They study a sample of 130 large and middle sized representative firms in the period 1996-1998.<sup>28</sup> Households (individuals, managers, other past and current employes and their families) and the state (Restitution fund and the Capital fund) are also the largest shareholders of the firms in their sample. Compared with the KDD data, households and PIDs have much larger equity stakes. Furthermore, the shareholdings of PIDs in the sample companies are increasing.

The aggregate structure of equity ownership helps us identify the largest owners and reflects the dynamics of ownership structure. It doesn't say anything about the concentration of

<sup>28</sup> Large companies are defined as the companies with more than 500 employees. The middle-sized firms have between 300 and 500 employees.

Table 5: Summary statistics on the ownership dispersion of firms, listed on the LJSE, 1996-1999 (end of the years). Blockholdings are the sum of ownership stakes that exceed 5 percent.

	1996	1997	1998	1999
Mean blockholdings	37.1%	43.3%	40.1%	45.7%
Median blockholdings	37.1%	41.5%	40.6%	45.5%
Number of firms	33	63	97	159

Source: KDD and own calculations.

ownership. To find out more about ownership concentration we next inspect the ownership structure of individual companies. We separate the firms, whose shares are listed on the LJSE, from those with non-listed shares. We end this section with the discussion of PID ownership.

#### 4.1 Ownership dispersion of the LJSE listed firms

It is important to see how dispersed shares are over different shareholders, because higher ownership concentration may imply less trading in a particular stock, which might lead to lower market liquidity. We explore the ownership concentration of Slovenian firms using the data on cumulative shareholdings of investors, who hold more than 5% of shares, in each company in the KDD registry. KDD provided us with data on the end-of-year blockholdings for each company in years 1996-1999. We match the data on blockholdings with the LJSE data on market capitalization and annual turnover for the shares traded on the LJSE. The number of companies, for which all three variables are available, is reported in Table 5. Our sample is a good representation of the listed firms. The data for 1999, for example, covers 159 out of 180 shares traded on the LJSE. Shares in the sample, including PID shares account for 97% of total equity market capitalization, and 94% of the total annual turnover of shares in 1999.

The mean sum of shareholdings larger than 5%, and the median of this sum serve as the proxies for the concentration of ownership. Both statistics dropped slightly in 1998, but increased substantially in 1999. The 1998 decrease is probably due to the introduction of PID shares on the LJSE. PIDs have a large shareholder base, and their shares are widely held.

Our simple statistics suggest that ownership concentration of listed companies is increasing. Large shareholders on average owned more than 45% of shares of the listed companies at the end of 1999. The numbers for some other continental European countries are similar. In Germany, for example, the mean of cumulative blockholdings was 42.2% in 1998. The ownership concentration of Belgium listed firms seems to be much higher. There, large shareholders together held 60.5% of shares of listed companies in 1996.<sup>29</sup> Becht (1999) shows that such ownership structure negatively affects the liquidity of Belgium and German stock market.

<sup>29</sup>The Belgium and German data refers to the Brussels Stock Exchange and the Frankfurt Stock Exchange, respectively. It is borrowed from Becht (1999).

Table 6: Summary statistics on ownership dispersion of KDD registered firms, not listed on the LJSE, at the end of years 1996-1999. Instead of the number of firms we report the number of stocks in the registry here. The two differ due to multiple issues of stocks by the same company.

	1996	1997	1998	1999
Mean blockholdings	53.7%	55.2%	62.0%	66.9%
Median blockholdings	51.8%	52.5%	58.3%	64.7%
Number of shares in the KDD registry	173	284	367	576

Source: KDD and own calculations.

Table 7: Summary statistics on the ownership of PIDs in the firms that were registered with KDD at the end of years 1996-1999.

Year	LJSE listed firms			Unlisted firms		
	Mean shareholding of PIDs	Median shareholding of PIDs	Number of firms with PID ownership	Mean shareholding of PIDs	Median shareholding of PIDs	Number of firms with PID ownership
1996	19.2%	17.7%	30	15.8%	18.3%	167
1997	21.6%	21.1%	55	24.3%	20.0%	209
1998	23.7%	20.0%	66	24.8%	20.0%	269
1999	24.5%	20.9%	100	25.6%	20.0%	361

Source: KDD and own calculations.

## 4.2 Ownership dispersion of unlisted firms

The summary statistics on the ownership concentration in Table 6 show that compared with listed firms (see Table 5), the ownership concentration of unlisted firms is higher (note that the unlisted companies represent the vast majority in the KDD registry). The ownership concentration of unlisted firms is also monotonically increasing. Almost 67% of shares in an average unlisted company were held by large shareholders at the end of 1999. Among the shareholders of Slovenian companies, PIDs are probably becoming a larger group each year. In the next subsection we check this premise.

## 4.3 Ownership stakes of PIDs

The increasing ownership concentration of Slovenian firms might be a result of the larger ownership stakes held by PIDs. Prašnikar et al. (1999) argue that unlike the privatization-related state funds, which are on average decreasing their ownership stakes, and diversifying their portfolios, PIDs are doing the opposite: their ownership stakes in the years 1996-1998 have increased. The closer inspection of the data on ownership stakes of PIDs in the firms that are in the KDD registry concurs with the observations of Prašnikar et al. (1999).

Summary statistics on PID ownership in years 1996-1999 are in Table 7. We present the statistics for listed and unlisted firms in two separate panels. The numbers suggest that the number of listed and unlisted firms with PID ownership is increasing. Moreover, the average stake of PIDs in listed and unlisted firms is monotonically increasing over the studied period. However, the ownership stakes of PIDs in the unlisted firms grow faster. With the exception of year 1996, the percentage of PID owned shares is on average slightly higher for the unlisted firms. The increase in average PID ownership stakes might also come at the expense of foreign shareholders, whose ownership stakes in the listed firms are decreasing. At the end of 1999, they held 7.98% of total equity market capitalization. A year earlier, they owned 8.86%.

There are mixed opinions and little evidence on the role of PIDs in the companies they own. Their ownership stakes in many firms are large enough for PIDs to influence the management.<sup>30</sup> Bohinc and Bainbridge (2000) claim that PIDs (like other institutional investors) intervene even in the day-to-day business decisions of the management boards. They actively participate in shareholder meetings, choose candidates for the supervisory board, control selection of management board members, and exert informal pressures on the management board.

In their prospectus for the listing on the LJSE, most PIDs state that they will keep widely diversified portfolios *and* actively participate in the management if that might lead to better performance of the companies. Prašnikar and Gregorič (1999) argue that instead of striving for well diversified portfolios, PIDs attempt to be active shareholders. The question is whether they possess the required knowledge, experience and abilities. The two-tier governance structure of the Slovenian corporations enables PIDs to exert their control and expropriate the control benefits, primarily through their representatives in the supervisory boards. In contrast, Žnidaršič-Kranjc (1998) emphasizes the positive role of PIDs and argues that PIDs have decided to become active shareholders and to improve the value of the companies that they own. There is no empirical evidence that would confirm either of these arguments, only the anecdotal evidence on the negative effects of PIDs' presence in the privatized firms. Whether or not PIDs act as prudent 'corporate governors', remains an interesting topic for future research. In this paper we focus on the influence of PIDs on the stock market.

## 5 PIDs and the stock market liquidity

PIDs may affect the aggregate liquidity of the stock market, and the liquidity of individual stocks. If we focus on trading volume as a measure of liquidity, we could say the following. First, trading by PIDs and the trade in shares of PIDs, if listed, get reflected in the aggregate trading volume and in stock prices. Second, through individual transactions by PIDs, or on behalf of PIDs, market prices and trading volumes of individual shares are affected. In the second case, the size of the ownership stakes of PIDs might play an important role.

With respect to the aggregate market impact of PIDs, note that PIDs traded primarily outside the stock exchange. Initially, PIDs traded mostly through the auctions carried out

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<sup>30</sup>Due to the one share-one vote principle, the influence of PIDs depends directly on their ownership stakes.

by the Development fund. Soon, they started to trade with each other, and with the other two privatization-related state funds.<sup>31</sup> According to the Securities Market Agency's annual reports, PIDs trade mostly among each other. This trading takes place entirely off the exchange, and there is no evidence that would suggest that it has an impact on the liquidity of the LJSE equity market.

However, PIDs are also purchasing and selling shares on the stock market. In addition, shares of PIDs are also traded on the exchange, thereby affecting the overall trading volume, and possibly market liquidity. The most direct way of analyzing the impact of PIDs on the liquidity of individual shares would be to look at the transaction prices of shares purchased or sold by PIDs on the LJSE. Unfortunately, such data is currently only available for supervisory purposes. The difficulty lies in the fact that PIDs trade through multiple brokers. Consequently, transactions by PIDs appear under different codes that are the proprietary information of the LJSE members.

In the absence of transaction data we use the information on ownership stakes of PIDs and other large shareholders in the cross-section analysis where we show their impact on market liquidity. Before that we use a simple method to test for the effect of trading volume of PID shares on the trading volume of the rest of the shares. In the same spirit, we also look at whether the increasing importance of PID shares, which shows in their contribution to the total equity market capitalization, has any impact on the liquidity of the non-PID shares.

## 5.1 The impact of PID shares on the trading volume of non-PID shares

The introduction of PID shares on the LJSE increased the number of listed securities and the aggregate trading volume. In addition, the presence of PID shares on the stock exchange might also have spill-over effects on the rest of the market. At first sight, the data suggests that this might be the case. If we run a regression of trading volume of non-PID shares on the trading volume of PID shares in the same period we find a positive and significant relation. However, such relation might be spurious. Changes in the series might simply be driven by similar factors. What we need is an appropriate test of the hypothesis that the trading intensity of PID shares increases the trading intensity of non-PID shares.<sup>32</sup>

In Figure 6 we plot the trading volume of non-PID shares, its mean and its standard deviation. The mean and the standard deviation are calculated recursively, by enlarging a window by one day, starting with January 3rd, 1996. Standard deviation and the mean of the trading volume of non-PID shares increased with the listing of PID shares, which started in January 1998, and continued until the end of 1999. Note that trading in PID shares increased considerably by the end of 1998 (see also Figure 3), when the majority of PID shares were already listed. The increase in the mean and the standard deviation of non-PID shares coincides with the active trading in PID shares in the second part of 1998 and in the beginning of 1999.<sup>33</sup> Since we

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<sup>31</sup>For off-exchange trading with other parties, PIDs need an additional permission from the Securities Market Agency.

<sup>32</sup>We can measure the trading intensity of shares either as trading volume in Bn SIT, as a number of transactions, or as a number of shares.

<sup>33</sup>Figure 6 also illustrates how the (previously mentioned) price manipulations, which took place in 1996,

Table 8: The results of the Granger causality test for the daily trading volume of PID shares and non-PID shares in the period January 1998 - June 1999. The null hypothesis is that trading volume of PID shares does not Granger cause the trading volume of non-PID listed shares. The number of observations is 374, minus the number of lags.

Number of lags	F Statistic	p-value
1	8.247	0.004
2	5.319	0.005
3	4.494	0.004
4	3.235	0.012
5	3.322	0.006

Source: LJSE and own calculations.

cannot associate the changes in trading volume of non-PID shares with any other particular events of this period we could consider them to be a side effect of active trading in PID shares. In order to test this hypothesis formally, we would have to make assumptions about the time series properties of the daily trading volume of non-PID shares.<sup>34</sup> Due to numerous outliers and multiple periods of increased variance in the trading volume of non-PID shares, it is hard to model this series in a way that would fit the data reasonably well and allowed us to perform appropriate statistical tests, like the Chow break-point test, for example. Due to this limitation we can only use some simple graphical and statistical tools to show that the trading volume of non-PID shares might have been accelerated by the trading intensity with PID shares.

First, we perform the Granger-causality test and test the null hypothesis that the trading volume of PID shares does not Granger cause the trading volume of non-PID shares. For calculating the F-statistic we use daily data for the period January 1998-June 1999. We can reject the null hypothesis (for up to five lags of the trading volume of PID shares). We can not reject the null hypothesis that the trading volume of non-PID shares does not Granger cause the trading volume of PID shares.

Second, we plot the actual daily trading volume of non-PID shares, the average daily trading volume calculated from the monthly trading volume ( $Dailyavg(m)$ ), and the standard

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affected the means and the volatility of the trading volume of shares.

<sup>34</sup>If we take one of the simplest models as an example, and assume that the log of the trading volume of non-PID shares grows along the linear trend we can test for the structural break in the trading volume of non-PID shares in the period, when PID shares became actively traded on the LJSE. We estimate the regression equation  $\log y_t = a + \lambda t + e_t$ , where  $y_t$  is the trading volume of non-PID shares in Bn SIT,  $t$  is time, and  $a$  and  $e_t$  are the regression constant and the error term, respectively, using the daily data for the period January 1997-September 1999 (we exclude the 1996 observations, because the stock market in 1996 can hardly be described as 'regular', as we pointed out in section 3.1). The estimate of the daily growth rate,  $\lambda$ , has positive and significant value. When we perform a Chow-breakpoint test, testing for a structural break in November 1998, we can not reject the hypothesis of no structural break. We can also reject the null hypothesis of no structural break if we choose December 1998 or January 1999 as a potential breakpoint. If we re-estimate the model for the two sub-periods (i.e. for the periods before Nov 1st, and after Nov 1st, 1998), we see that the two estimates of  $\lambda$  differ not only in size, but also in sign (the coefficients are +0.001 and -0.004, respectively), which is a clear indication that our simple model does not really fit the data.

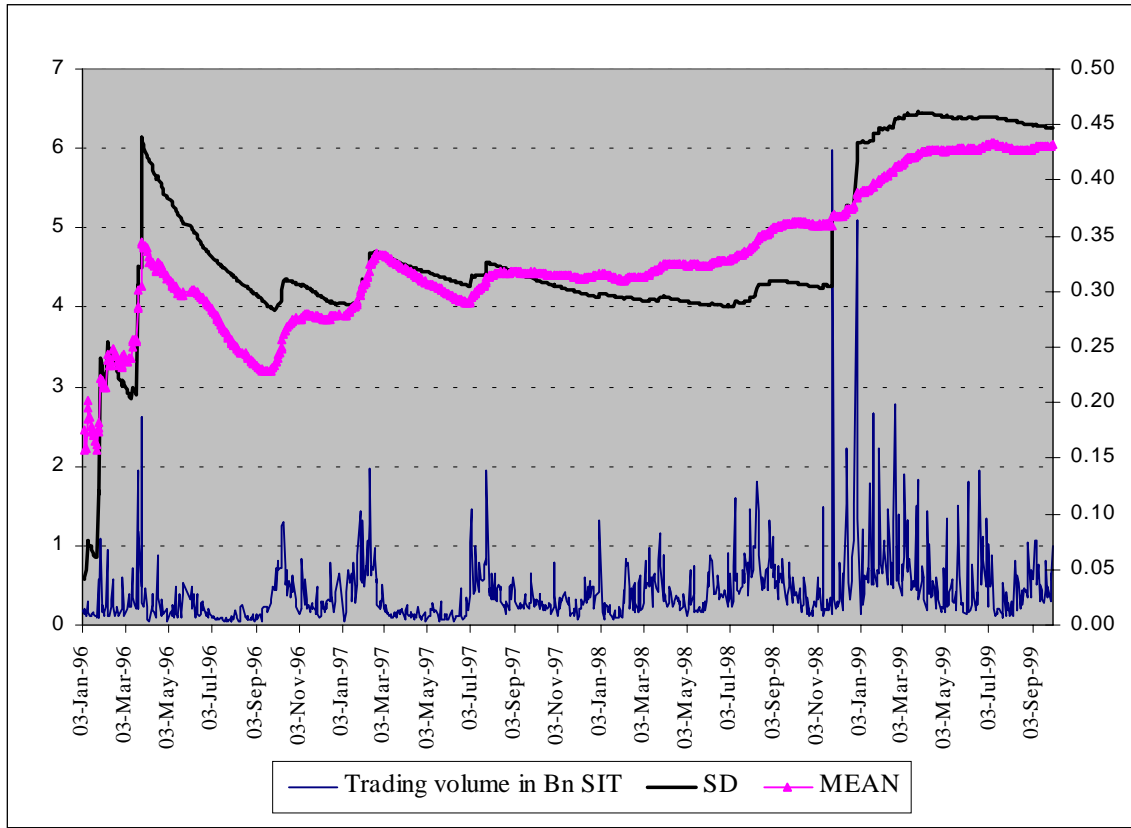


Figure 6: *Daily trading volume of non-PID shares, its mean and its standard deviation (SD) in years 1996-1999 (all in Bn SIT). For better presentation we plot the trading volume on the primary axis, and the other two series on the secondary axis.*

deviation of the latter ( $SDvol(m)$ ) in Figure 7. The average daily trading volume and its standard deviation are also calculated recursively. The graphs of the three series are plotted in Figure 7, with standard deviation plotted on the secondary (i.e. the right-hand side) axis. We can see that the average daily volume becomes smoother when calculated from monthly data. The effect of outliers is then reduced. The occurrence and persistence of shocks in the actual daily trading volume is visible in the graph of standard deviation of the average daily trading volume. There are a few outliers, around which the trading volume of non-PID shares temporarily rises and then falls again. The standard deviation reached its highest levels in the period November 1998-March 1999, when the level of trading volume of PID shares was increasing fast. It seems that trading in shares of PIDs also affected the volatility of the trading volume of non-PID shares in this period. The "shocks" to the trading volume of non-PID shares become less frequent and of lower magnitude in the second half of 1999, when the "PID effect" seems to have faded away.

Such graphical analysis can only provide indirect evidence of the impact of the trading volume of PID shares on the rest of the equity market. The shocks at the end of 1998 might be induced by the trade in shares of PIDs. On the other hand, they may simply provide evidence that

trading volume of stocks on the exchange is correlated. The time series of the trading volume of non-PID shares is so chaotic, and determined by outliers, that it is almost impossible to describe it with a model, without including additional explanatory variables. The analysis of other determinants of trading volume of shares goes beyond this paper.

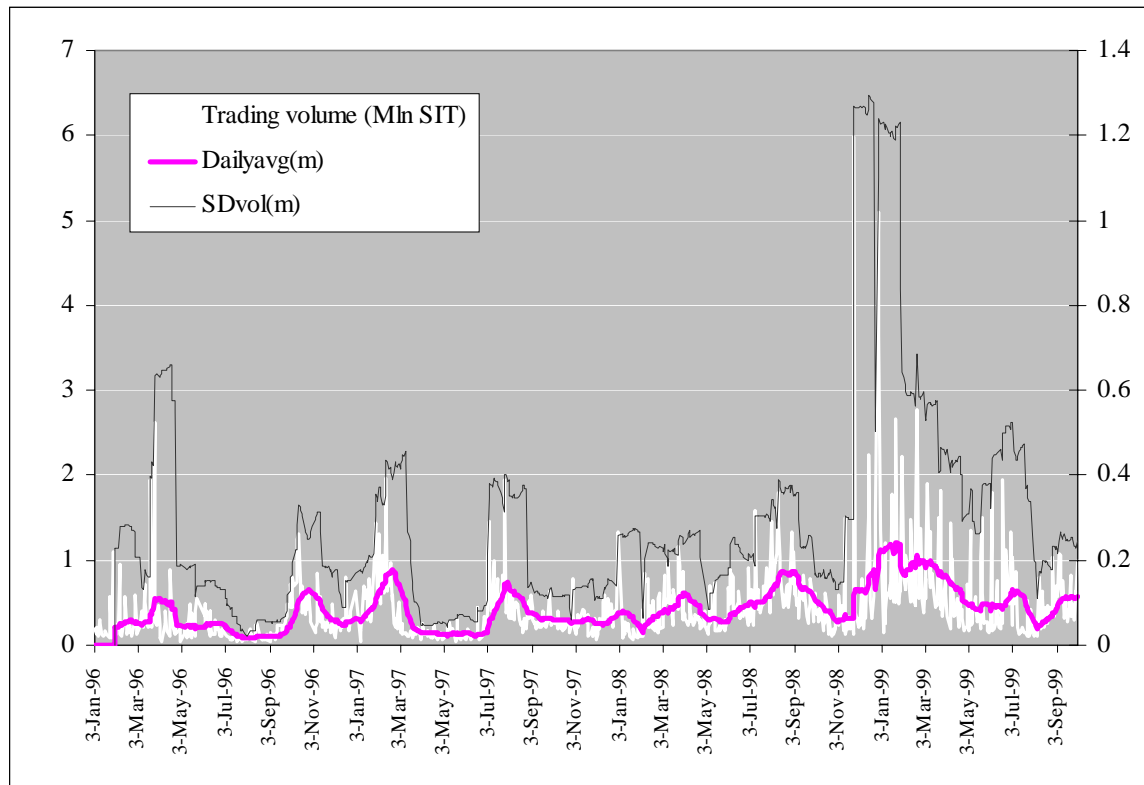


Figure 7: Actual daily trading volume of non-PID shares, the average daily trading volume (derived from the recursively calculated monthly trading volume), and the standard deviation of the average daily trading volume in the period January 1998 - September 1999.

## 5.2 PIDs and the equity market liquidity

Because the positive impact of trading volume of PID shares on the rest of the market can be due to the common factors (which cause the correlation in trading volume of different stocks), trading volume is not a very good measure of liquidity in this case. Therefore we divide the trading volume of non-PID shares by their respective market capitalizations, to get what we call market turnover. Then we check whether the increasing presence of PID shares in the market, which shows in the increasing proportion of their market capitalization in the total equity market capitalization (of PID and non-PID shares) has any impact on market turnover, our new measure of market liquidity. The graphs of the percentage of PID shares in the total market capitalization ( $\%Cap(PIDs)$ ) and the market turnover of non-PID shares are in Figure ???. Because data on market capitalization is only available on monthly basis, while the trading volume is provided by the LJSE daily, we had to construct a daily

measure of capitalization. Instead of taking a simple average (based on two data points) we assumed that market capitalization increases by the same rate every day. We used the same assumption to construct daily market capitalization for the whole market and for PID shares alone.

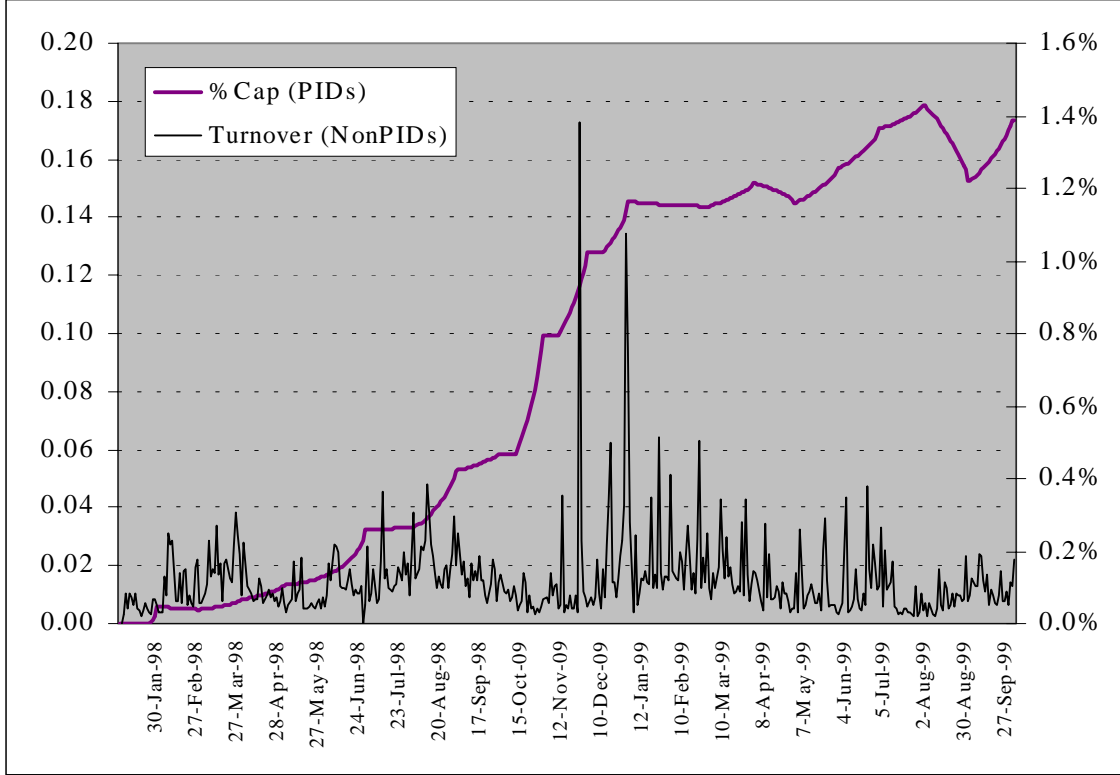


Figure 8: *Market capitalization of PID shares as a percentage of total equity market capitalization, and the market turnover of LJSE traded shares (excluding PIDs), January 1998-September 1999.*

Although the trading volume of non-PID shares is now scaled by their estimated daily market capitalization, the series remains chaotic, and has multiple outliers. If we try to explain the variation in non-PID turnover with the share of PIDs in total market capitalization using ordinary least squares we get an interesting result. The estimated equation is:

$$T_{t,nonPID} = 0.001 + 0.155C_{t,PID} + 0.280T_{t-1,nonPID} + 0.08T_{t-2,nonPID} + u_t \quad (1)$$

(13.230)
(2.002)
(5.868)
(1.716)

$T$  is the market turnover ratio and  $C$  is the share in the total market capitalization. There are 440 observations in the sample, and  $R^2$  is 0.11. The regression results show that if the change in the contribution of PID shares to the total market capitalization relative to the previous day were 100% larger, the market turnover of non-PID shares would increase by

Table 9: Descriptive statistics on the ratio of annual trading volume to the end-of-year market capitalization of the LJSE listed companies, 1996-1999. *SD* is standard deviation and *N* the number of observations.

	1996	1997	1998	1999	1996-1999	1997-1999
<i>N</i>	33	63	97	159	352	319
<i>mean<sub>ratio</sub></i>	146%	19%	19%	31%	36%	25%
<i>median<sub>ratio</sub></i>	20%	16%	15%	21%	17%	17%
<i>max<sub>ratio</sub></i>	315%	70%	91%	386%	31%	386%
<i>min<sub>ratio</sub></i>	0.3%	0%	0%	0%	0%	0%
<i>SD<sub>ratio</sub></i>	547%	18%	19%	42%	172%	33%

Source: KDD, LJSE and own calculations.

15%. The positive impact of PIDs on market turnover is statistically significant. We find some evidence that the increasing presence of PID shares on the LJSE positively influenced the liquidity (market turnover) of the rest of the LJSE-traded shares.

### 5.3 PIDs and liquidity of individual stocks

In section 4 we have argued that the degree of ownership concentration in the Slovenian firms is increasing. The concentration is the consequence of the increasing ownership stakes of PIDs and other large shareholders. At the same time, the liquidity of the stock market seems to be deteriorating in the last years if we look at the monthly turnover ratios (see section 2). Could the two phenomena be related?

In this section we empirically investigate whether the increasing ownership concentration of Slovenian corporations negatively affects market liquidity, or not. We first present our data. The estimation results follow and the extensions of the estimated model conclude this section.

#### 5.3.1 Data

The basic inputs for the regressions we perform in this section come from the KDD dataset (see section 4). Market liquidity of individual shares is measured in the same way as the overall stock market liquidity (see section 2), i.e. as the ratio of the annual trading volume to the end-of-year market capitalization. In Table 9 we show the means of this 'turnover' ratio (*mean<sub>ratio</sub>*) for each year in the period 1996-1999. We see that our proxy for stock market liquidity dropped sharply in 1997, but started to show signs of recovery after 1998. The average ratio for year 1999 is much lower than three years earlier.

Table 10: Estimation results for the regressions of the log of the ratio of trading volume to market capitalization (dependent variable) for 1996 and 1999, and for the pooled 1997-1999 data. *t*-values are between the brackets.

	1996	1999	1997-1999	1997-1999
<i>constant</i>	-3.430*** (-3.949)	-1.228*** (-6.823)	-1.510*** (-9.912)	-1.271*** (-4.068)
<i>B</i>	4.446* (1.626)	-1.452*** (-2.841)	-0.835** (-2.236)	-1.021* (-1.832)
<i>B<sub>PIDs</sub></i>				-1.233* (-1.939)
<i>D<sub>97</sub></i>			-0.567** (-2.281)	-0.493** (-1.958)
<i>D<sub>98</sub></i>			-0.318* (-1.948)	
<i>R</i> <sup>2</sup>	0.11	0.06	0.04	0.05

\*\*\*Statistically significant at 1%.

\*\*Statistically significant at 5%.

\*Statistically significant at 10%.

### 5.3.2 Estimation

The purpose of this cross-section analysis is to see whether shareholdings by PIDs and other large stockholders decreases liquidity of individual shares. We use the logs of the ratio of trading volume over market capitalization as a proxy for the measure of market liquidity. We estimate two different models. In the first model we use the sum of ownership blocks larger than 5% (*B*) as an explanatory variable. We estimate it for all LJSE-traded stocks in our sample. In the second model we introduce the percentage of issued shares owned by PIDs (*B<sub>PID</sub>*) as an additional explanatory variable.<sup>35</sup> In the estimation of the second model we only take into account the non-PID shares.

We run separate regressions for each year between 1996 and 1999. In the end, we pool the data for years 1997, 1998 and 1999, and perform the same regression on the pool. In the pooled regression we also include the dummy variables for years 1997 and 1998, i.e. *D<sub>97</sub>* and *D<sub>98</sub>*, respectively. In 1997, the Bank of Slovenia introduced restrictions on foreign portfolio investments, which made the latter fairly unattractive for foreign investors. The 1998 dummy is included to capture the effects of the introduction of PID shares to the LJSE. The estimation results for both types of models are in Table 10. In the table we only report results for the models that are statistically significant at 5% level. Standard errors are (heteroscedasticity) robust.

<sup>35</sup>Due to the construction of variables in our dataset we are unable to separate the blockholdings of PIDs (i.e. ownership stakes of individual PIDs that exceed 5%) from other blockholdings, and from the total ownership of PIDs in individual companies. However, the sum of blockholdings and ownership stakes of PIDs are not strongly correlated (the correlation coefficient is +0.22), which reduces the extent of the potential multicollinearity problem in the estimations.

Regression results deserve a few remarks. First, the values of  $R^2$ s and regression coefficients are rather small. Second, the sign of the coefficient for the sum of blockholdings in the 1996 regression is positive. As such, they concur with the argument of Bolton and von Thadden (1998) that blocks and liquidity can move in the same direction. It seems that in 1996, when our measure of market liquidity was much larger than in other years (see Table 9), cumulative blockholdings were not hampering the liquidity of individual stocks. Large trading volume might be a result of block-building. However, the 1996 results require a great deal of caution. First, the number of observations is small. Second, the results are very likely to be driven by the manipulations-based trading. It is believed that a large part of the 1996 trading volume was due to the illegal dealings and the consequences of the revelation of the fact that price manipulations took place. For this reason, we exclude 1996 data from our pooled regressions.

Third, the regressions for 1999 and for the pooled data deliver similar results. The cumulative shareholdings of large investors decrease the turnover ratio of individual stocks. Shareholdings of PIDs also show a statistically significant negative impact on this measure of market liquidity. Even after controlling for the cumulative shareholdings of other large investors and for time, market liquidity of listed shares decreases with the percentage of shares held by PIDs (see the last column of Table 10). According to our model, a firm with no blockholdings and zero ownership by PIDs would have an annual market turnover (or liquidity) ratio of 28% in the period 1998-1999. If blockholders own 20% of the firm's equity and PIDs 10%, then the annual liquidity of its stocks drops to 20%. If the ownership of blockholders and PIDs increases three times, the annual liquidity of a company drops to 10%. The annual liquidity of a company that was fully owned by PIDs, where PIDs are only holding blocks larger than 5%, would be less than 3% in years 1998-1999.

Our results concur with Becht (1999), who finds a negative impact of cumulative blockholdings on the market liquidity in a sample of Belgium and German exchange-listed shares. The value of the coefficient of the cumulative blockholdings in our 1999 regression is in-between the coefficients for Belgium and Germany, as estimated by Becht (1999). Our pooled regression gives a lower coefficient of cumulative blockholdings. Also, the variation in cumulative blockholdings in Slovenian regressions explains considerably less variation in liquidity of shares, compared to the regressions for Belgium and Germany (our  $R^2$ s are much lower).

### 5.3.3 Robustness tests

Annual market turnover is a very crude measure of liquidity of individual stocks. Therefore we test if our results are robust to different liquidity measures used, and to the inclusion of foreign ownership of the traded stocks. The results of these additional regressions are below.

**Foreign ownership** As a first test of the robustness of the regression results above we add information on foreign ownership of shares in the listed companies. We check whether foreign shareholdings have any impact on the (log of the) turnover ratio, i.e. the ratio of trading volume (in SIT) to the end-of-year market capitalization. We use the same pooled 1997-1999 dataset as before, but we add a dummy variable  $D_F$ , which takes a value one if foreigners

hold shares in the company, and zero otherwise.

The average ownership by foreign investors decreased from 4.78% at the end of 1997, to 3.40% at the end of 1998 and further on to 3.07% at the end of 1999. Nevertheless, the regression results in column (1) of Table 11 show that foreign ownership has a significant and negative impact on the annual turnover ratio, which still serves as a proxy for liquidity. Because the restrictions of the Bank of Slovenia that made short holding periods of shares of foreign investors particularly unattractive (and expensive), this result may not come as a surprise. Longer investment horizons of foreigners may be one explanation for the negative affect of foreign ownership on the liquidity of stocks.

**Other measures of liquidity based on trading volume** So far we only employed the annual turnover ratio of stocks as a measure of their liquidity. Now we are going to use other measures of liquidity of individual stocks that have been suggested in the literature, and run virtually the same regressions as before. Based on the daily data we construct the following empirical measures of liquidity: the log of the annual traded value in million SIT,  $V$ , the log of the average daily traded value in SIT,  $\bar{V}$ , the log of the average daily trading volume in shares,  $\bar{Q}$ , and the average daily percentage of outstanding shares traded,  $\bar{Q}_\%$ .

The measure we apply are based on the trading volume of shares. Trading volume is a natural measure of liquidity (Amihud (2000)). The higher the willingness of people to trade, the larger the trading volume per day, and per year. Typically, stocks of larger companies, i.e. companies with larger market capitalization, also have larger trading volumes. Therefore, we control for size (using the log of market capitalization of stocks,  $C$  as a size variable), when we apply trading volume as a liquidity measure.

Regression results in Table 11 are qualitatively the same as before, except that the  $R^2$ s are now somewhat higher. The ownership stakes of PIDs have a negative impact on trading volume (and thus liquidity), even after we control for the size of the companies and the cumulative shareholdings of other large investors. Foreign ownership decreases trading volume. Stocks of PIDs have on average higher trading volume and lower total market capitalization. The sign of the coefficient of cumulative blockholdings is not stable (it changes according to the measure used), but it is negative when the coefficient is statistically significant at the usual levels.

**Liquidity measures based on market prices** At last we test if the negative impact of cumulative blockholdings and PID ownership is robust to the measures of liquidity that take into account daily market prices. For stock markets outside the US, where transaction data is not available, Amihud (2000) proposes the average daily ratio of absolute % return on a stock to its daily (dollar) trading volume as a measure of the stock's illiquidity.

We apply a few variants of Amihud's (2000) measure. The original one is the daily percentage price change divided by the daily trading volume (in thousand SIT),  $\frac{\% \Delta P}{V}$ . It serves as a rough measure of (daily) price impact of the order flow. We also construct two other versions of this measure, replacing Amihud's (2000) numerator by the difference between the daily highest

Table 11: Regressions results for different liquidity measures. We use the pooled (1997-1999) data, which excludes shares of PIDs. The dependent variable is shown in the first row of each column. *t*-values are between the brackets.

	$\log(\text{ratio})$ (1)	$\log V$ (2)	$\log \bar{V}$ (3)	$\log \bar{Q}$ (4)	$\log \bar{Q}_{\%}$ (5)
<i>constant</i>	-0.551 (-1.318)	-6.714*** (-5.226)	-8.883*** (-7.502)	1.458 (1.212)	-8.973*** (7.258)
<i>B</i>	-1.439** (-2.457)	-0.342 (-0.575)	0.644 (1.224)	-0.223 (-0.408)	-0.377 (-0.679)
<i>B<sub>PIDs</sub></i>	-1.270* (-1.950)	-1.159* (-1.766)	-1.560*** (-3.034)	-1.741*** (-3.089)	-1.118** (-2.068)
$\log C$		1.242*** (23.406)	0.813*** (16.316)	0.288*** (5.442)	0.136*** (2.617)
<i>D<sub>F</sub></i>	-0.646*** (-2.746)		-0.827*** (-3.639)	-0.537** (-2.218)	-0.655*** (-2.770)
<i>D<sub>97</sub></i>	-0.501** (-2.016)	-0.399* (-1.729)		-0.356* (-1.834)	-0.610*** (-2.642)
<i>D<sub>98</sub></i>					-0.348** (-2.244)
$R^2$	0.07	0.67	0.55	0.16	0.11

\*\*\*Statistically significant at 1%.

\*\*Statistically significant at 5%.

\*Statistically significant at 10%.

Table 12: Regression results for the liquidity of the LJSE-traded stocks in the 1997-1999 pool. Dependent variables appear on the top of each column. *t*-values are between the brackets.

	$\log\left(\frac{\% \Delta P}{V}\right)$ (1)	$\log\left(\frac{P_{MAX}-P_{MIN}}{V}\right)$ (2)	$\log\left(\frac{P_{ASK}-P_{BID}}{V}\right)$ (3)	$\log\left(\frac{P_{ASK}-P_{BID}}{P}\right)$ (4)
<i>constant</i>	17.380*** (7.643)	-0.063 (-0.044)	16.246*** (9.552)	9.071*** (12.102)
<i>B</i>	3.353*** (4.932)	1.210* (1.795)	3.969*** (6.352)	1.294*** (3.952)
<i>B<sub>PIDs</sub></i>	1.416** (2.263)	1.072* (1.653)	0.919 (1.306)	-0.128 (-0.416)
$\log C$	-1.114*** (-11.552)	-0.162** (-2.594)	-0.863*** (-11.075)	-0.577*** (-18.710)
$R^2$	0.58	0.07	0.54	0.69

\*\*\*Statistically significant at 1%.

\*\*Statistically significant at 5%.

\*Statistically significant at 10%.

and lowest price,  $P_{MAX} - P_{MIN}$ , and by the difference between the best daily ask and the best daily bid price,  $P_{ASK} - P_{BID}$ . In addition, we calculate a sort of proportional daily spread, defined as the difference between the best daily ask and the best daily bid price, divided by the average daily transaction price,  $\frac{P_{ASK}-P_{BID}}{P}$ . All liquidity measures are averaged over each stock and each year in the period 1997-1999.

If blockholdings and PID ownership hamper the liquidity of individual stocks, then the two variables should be positively related to the measures of illiquidity and the cost of illiquidity. In this case the regression coefficients for *B* and *B<sub>PIDs</sub>* in Table 12 should be positive. Regression results support this hypothesis. The higher the cumulative shareholdings, the higher the illiquidity of individual stocks in the pool. Stocks of larger companies are more liquid and their illiquidity costs are lower. We also find evidence that PID ownership increases the illiquidity of traded stocks. Time and foreign ownership do not show as statistically significant explanatory variables, therefore we excluded them from the regressions in Table 12.

Overall, our empirical analysis suggests that the impact of the increasing ownership concentration, as reflected in the higher cumulative ownership stakes of large shareholders, on the liquidity of the Slovenian stock market is negative. Furthermore, one particular group of shareholders - PIDs - additionally decrease market liquidity of listed stocks. The results are robust to the use of different empirical measures of liquidity.

## 6 Concluding remarks

In this paper we analyzed the influence of PIDs, the Slovenian closed-end mutual funds, on the liquidity of the equity market, organized within the Ljubljana Stock Exchange (LJSE).

We show that PIDs are growing fast in terms of assets value. Jointly with the much smaller open-end funds, the assets of PIDs already represent over 20% of Slovenia's GDP. However, almost half of PID assets are still in the form of ownership certificates. Excluding certificates, corporate shares represent more than 90% of the total PID portfolios. Through the purchases of shares and equity stakes on and off the exchange, PIDs are becoming larger shareholders in the listed and unlisted firms each year. Open-end mutual funds are still too small to have any impact on the stock market. If PIDs 'opened', open-end funds would have a much larger potential for influencing the stock market and its liquidity.

We looked at two aspects of the impact of PIDs on the stock market liquidity. The first aspect concerns the introduction of shares of PIDs to the LJSE. We provide some limited evidence that the trade in PID shares, and their increasing importance in the market capitalization of the equity market positively influenced the trading volume of non-PID shares and their liquidity in the period January 1998 - September 1999.

The second aspect of PIDs' impact on market liquidity is related to the ownership concentration of firms, and to the increasing ownership stakes of PIDs in the LJSE-listed firms. The ownership stakes of PIDs and other large shareholders, like the state funds, show a negative impact on the liquidity of the Slovenian stock market. This result concurs with the recent theoretical contributions, which suggests that the impact of large shareholdings on market liquidity can be negative. It is also in accord with the empirical evidence for some other continental European countries. Results are robust. When we use other liquidity measures, which reflect costs of illiquidity and the level of trading activity in listed stocks, we get qualitatively the same results. In addition, foreign ownership of listed securities shows a negative impact on different measures of liquidity as well.

There is a large set of compelling research questions that concern mutual funds and their impact on the equity market in Slovenia. The performance evaluation of PIDs and the impact of PIDs on the performance of firms they partially own, might be an interesting future research topic. The consequences of the dominant position of closed-end mutual funds for the efficiency of the financial system also deserve further study. In addition, PIDs are financial institutions within which the agency problems between the fund managers and the owners of the funds may be severe. Future research might shed more light on this issue.

In general, a shift from the studies of the high-frequency stock market data to the aggregate effects of the mutual fund trading and the aggregate determinants of liquidity has been observed in the research of developed financial markets (see Chordia et al. (1999), for example). Studies of the less developed financial systems still lack the analysis of high-frequency data. Empirical research of this type might provide valuable insights on the effects of institutional trading on the stock market around the world.

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# APPENDIX 1

## The institutional background of PIDs

PIDs are a rather unusual part of the Slovenian financial system. They were created by the Law on the transformation of ownership of business enterprises of 1992, as an indirect way of making the citizens of Slovenia the shareholders of Slovenian firms. Based on this law, each citizen, depending on his/her age, received an ownership certificate (a voucher) worth between 2500 and 5000 DM, for free. The ownership certificate gave each holder the right to buy shares. Its monetary value was registered on a special registration account that was opened for each citizen. Ownership certificates could only be exchanged for shares of transformed, i.e. 'privatizing' enterprises (through public offerings, by participating in internal distribution and internal sale of shares) and for shares of PIDs.<sup>36</sup> PIDs were created to buy shares of the privatizing companies on behalf of investors, either during public offerings, or through the auctions, which were organized by the Development fund. Shares of PIDs themselves became transferable when PIDs became listed on the stock exchange.

PIDs have a few features that distinguish them from the regular closed-end funds. First, they were initially selling their shares for ownership certificates (not cash), and they could only purchase the pre-determined assets (limited choice). Second, the nature of PID assets closely resembles the assets of venture capital funds (Žnidaršič-Kranjc (1998)). To make matters even more complicated, PIDs are not able to convert all certificates into financial assets. This became known as the problem of 'a black hole' in the assets of PIDs. PIDs claim that the size of the assets available to them is not sufficient to cover the value of ownership certificates they collected. The 'hole' is estimated to amount to about 10% of Slovenia's 1998's GDP (Ribnikar (1998)). As a consequence, PIDs demand additional assets from the state to 'use-up' the remaining certificates.<sup>37</sup>

Another way to fill this shortage of assets, and simultaneously provide the base for the funded second pillar of the pension system would be to transfer the shares of PIDs, which are backed by ownership certificates, to the individual accounts of the second pillar voluntary pension fund (Ribnikar (1998)). This idea was incorporated in the Law on the First pension fund of the Republic of Slovenia and transformation of the authorized investment companies that was passed in June 1999. Contrary to the expectations, only 3.4% of shareholders of PIDs used this additional 'right to choose' and converted their shares within the given period.<sup>38</sup> The low response may be due to factors, like the lack of information and publicity, the late reaction of the authorized management corporations, etc. Whatever the reasons, PIDs preserved their asset base and will be offered additional assets in one way, or another.

The history of PIDs seems to go hand in hand with the reform of Slovenia's pension system. The events in the second half of 1999 are just part of this joint process. PIDs would probably never achieve their today's status if the reform of the state pension system, as suggested and

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<sup>36</sup> Only the current and past employees of the firms, and their relatives were able to participate in the 'internal' distribution and sale of shares.

<sup>37</sup> Note that the state today owns a larger part of corporate sector than it did before the 'privatization.'

<sup>38</sup> Finančni trgi, November 1999.

discussed by Ribnikar (1998) took place. The essence of the proposal was to transfer the shares and ownership stakes of all (previously) socially owned companies to pension funds, not mutual funds. Hence, PIDs can be viewed as the joint product of the Slovenian mass 'privatization' process and the pension system reform. As a consequence, PIDs are often not considered 'real' financial intermediaries in the Slovenian academic community (see Ribnikar (1999)). According to Ribnikar (1999), PIDs do not facilitate the transfer of funds from households to enterprises. They perform two functions that have no positive effects on the corporate sector: (i) They enable their shareholders to sell shares, which they acquired for free and in this way induce consumption and reduce savings in the economy; (ii) Through sales and purchases of shares PIDs modify their portfolio structure in terms of concentration, not diversification (Ribnikar (1999)).<sup>39</sup> If we adopt such view of PIDs, studying the impact of PIDs on the official equity market may seem futile. However, the growth of their asset base and their ownership stakes in the companies seem to be significant enough to deserve more research.

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<sup>39</sup>The role of the stock market is criticized to have a similar function: it doesn't facilitate the transfer of funds into the corporate sector but instead helps individuals to sell what they received free of charge (Ribnikar (1999)).

# APPENDIX 2

## Open-end mutual funds

In terms of number and asset value, open-end funds represent only a small part of the Slovenian mutual fund industry. The asset value of all open-end funds together represents less than 2% of the total asset value of PIDs in the last five years (see Table 4). Even if we exclude ownership certificates from the assets of PIDs, this percentage doesn't exceed 3%. The average open-end fund in our quarterly mutual fund database (described in section 3) has a total asset value of 0.23 billion SIT, and is about fifteen times smaller than the average PID.

At first sight, the composition of assets of open-end funds looks significantly different from PIDs. Without ownership certificates, their portfolio structure looks rather similar. Figure 9 shows that stocks are the single most important investment category of the open-end funds. They are followed by bonds, bank deposits and cash and short-term securities. Among short-term assets, the securities issued by the Bank of Slovenia are predominant. These asset categories have been prevailing during the whole period 1994-1999. The proportion of shares in the portfolios of open-end funds is rising. This rise comes primarily at the expense of bonds and bank deposits. At the end of 1999, shares represented almost 79% of the total assets of open-end funds.

Compared to the average PID in our September 1996-June 1999 database, the average open-end fund holds a lower percentage of assets in shares (56%), and invests more in bonds (25.9%).<sup>40</sup> In order to meet the liquidity requirements prescribed by law, the average open-end fund also invests more in short-term securities (9.4%) and in cash (3.3%). Relative to the average PID, a higher proportion of shares in the portfolio of the average open-end fund are traded on the organized equity market than off-exchange (51% and 5%, respectively).

Based on the recent portfolio structure of open-end funds we might expect that index MF, which we created so that it reflects the movement of the net asset value per unit of an average open-end fund, would be highly correlated with the stock market index SBI.<sup>41</sup> In addition,

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<sup>40</sup>When we compare an average PID with an average open-end fund, we exclude ownership certificates from the assets of PIDs.

<sup>41</sup>SBI index is comprised of 19 most traded shares listed on markets A and B. It includes almost exclusively the shares of the privatized companies. Market capitalization of these shares are used as weights. The following formula is now in use:

$$SBI_t = \frac{\sum_{i=1}^N (p_{t,i} * q_{T,i})}{\sum_{i=1}^N (p_{0,i} * q_{T,i})} * 1000 * K_t$$

where  $N$  is the number of shares included in the index,  $p_{t,i}$  is the average price of stock  $i$  on day  $t$ ,  $p_{0,i}$  is the average price of stock  $i$  on January 1st, 1997.  $q_{T,i}$  is the number of  $i$  shares listed on the exchange on the day of setting (or changing) the weights, and  $K_t$  the adjusting factor for ensuring the index comparatively in time. MF index is calculated as a weighed average of the daily changes in the net asset value per unit of each mutual fund. The weights are the percentages of each fund's net asset value in total net asset value, and they change daily.

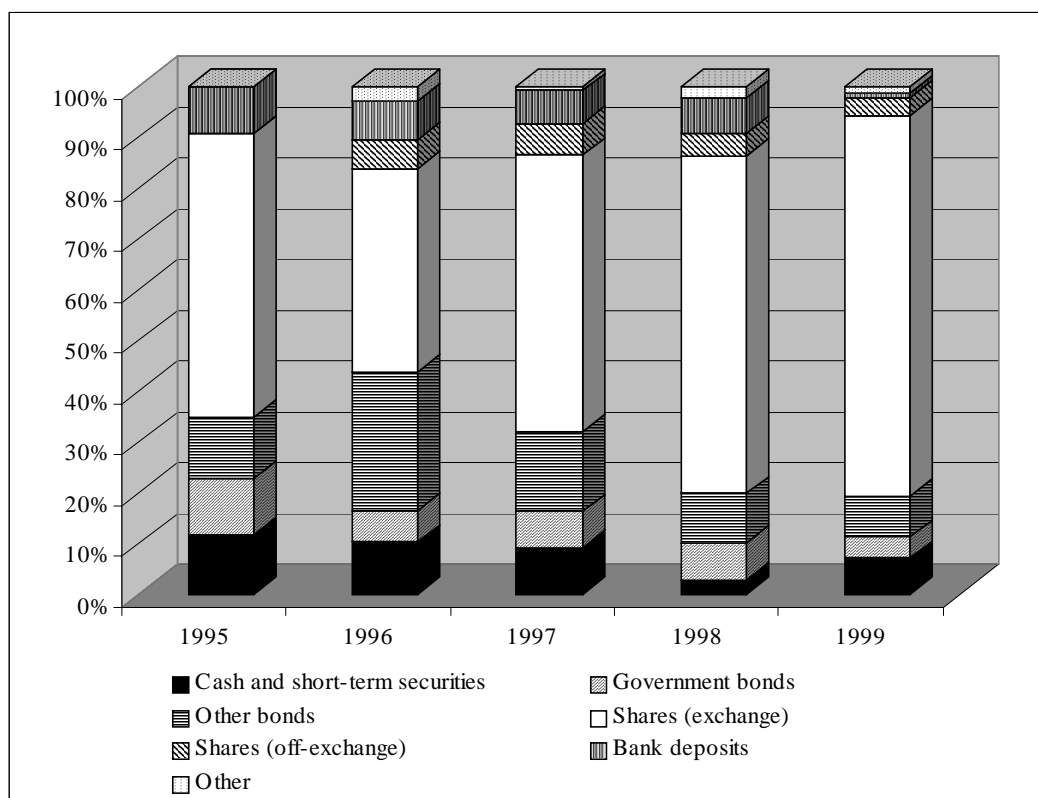


Figure 9: *Portfolio structure of open-end mutual funds in years 1995-1999 (end-of-year values).*

the correlation coefficient between MF and SBI should be higher than the correlation between indices SBI and PIX. In Figure 10 we plot the daily values of index PIX, the values of stock market index SBI, and the values of MF index in the first half of 1999. Contrary to our expectations, the correlation coefficient between the daily values of PIX and SBI in the first seven months of 1999 is higher (+0.85) than the correlation coefficient between MF and SBI (+0.76). We discuss the way, in which Slovenian open-end funds might affect the stock market index in the future in the rest of this appendix.

### Money flows to open-end funds and stock market prices

One of the advantages of the 'openness' of mutual funds is the transparency of prices of their assets. This enables the investors to follow their net asset value on a daily basis. The daily total net asset value of the Slovenian open-end funds in the period January 1996-June 1999 is depicted in Figure 11. It shows a positive trend that may be attributed to the positive returns on the assets in the fund portfolios, and to the net flows of money into mutual funds (the net flows of money into open-end funds are plotted in Figure 12.<sup>42</sup>).

<sup>42</sup>When plotting daily net flows we excluded the period January-March 1996, when each fund only consisted of one unit and had no flows of money, and the first two days of April 1996, when the funds received enormous amounts of money and started operating 'normally.'

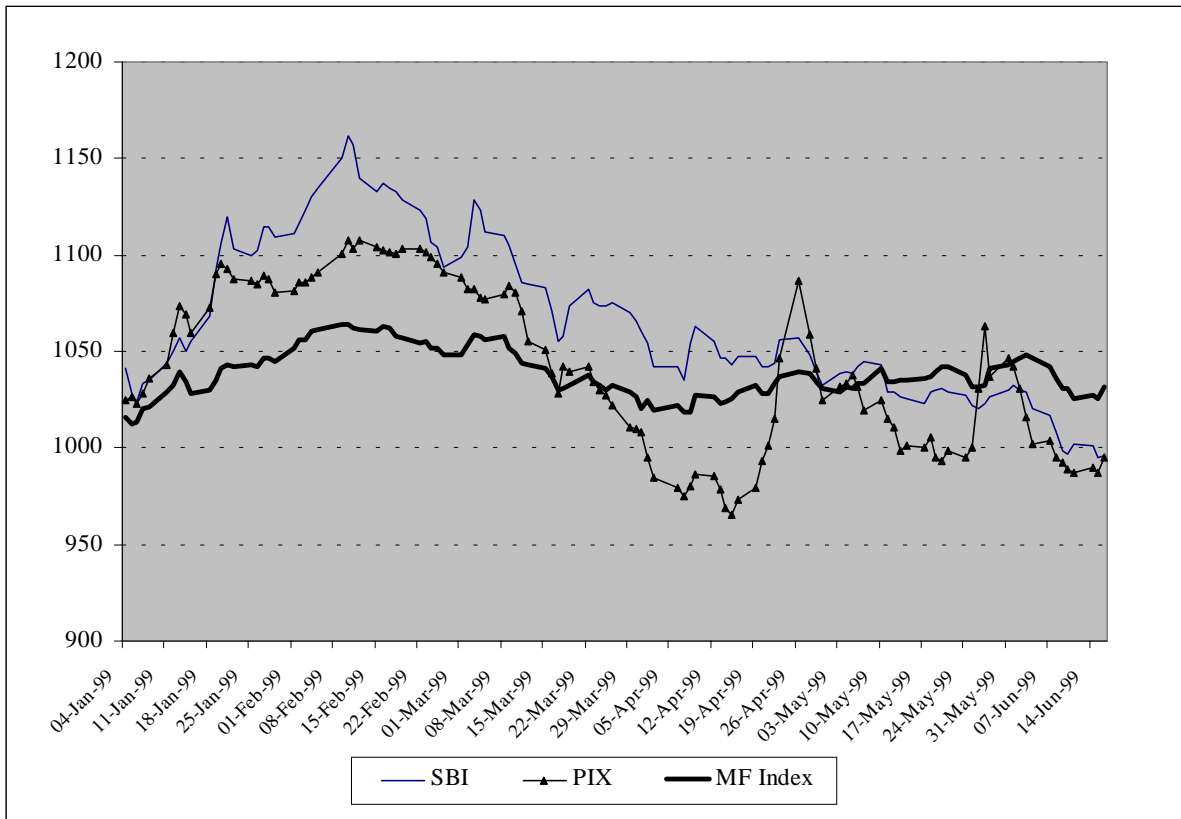


Figure 10: Daily values of indices SBI, PIX and MF in the period January 1999-June 1999. For comparison, all indices are recalculated using the values of Dec 30th, 1998, as a common base (Dec 30=1000).

An empirical relationship between net flows of money to the open-end funds and the stock market prices (and returns) has been found to exist in some stock markets. In the US, for example, where institutions account for over 60% of the overall NYSE equity trading, the flow-induced trading by mutual funds is one of the key determinant of the level of stock prices (Edelen and Warner (1999)). This notion inspired many recent empirical studies of the impact of flow-motivated institutional trading on (aggregate) market prices and returns.<sup>43</sup> Edelen and Warner (1999), for example, find a statistically significant long-run equilibrium relationship between the net flows of money into mutual funds and the level of stock market index on a large sample of US mutual funds.

The impact of net money flows to open-end funds on the daily stock index (its returns) in the LJSE is marginal, and statistically insignificant.<sup>44</sup> Considering the size of the flows, this

<sup>43</sup>See Warther (1995), Mosebach and Najand (1999), Edelen and Warner (1999), etc. Edelen and Warner (1999), for example, analyze daily and intra-day data and conclude that within the trading day market returns respond to new flow of money into mutual funds, while the daily flow responds to the information that drives the returns (with a lag). Their and other similar empirical studies suggest that aggregate flow can be used to study the aggregate price effect of institutional trading.

<sup>44</sup>Using daily data on net payments of individual open-end funds, provided by the Securities Market Agency,

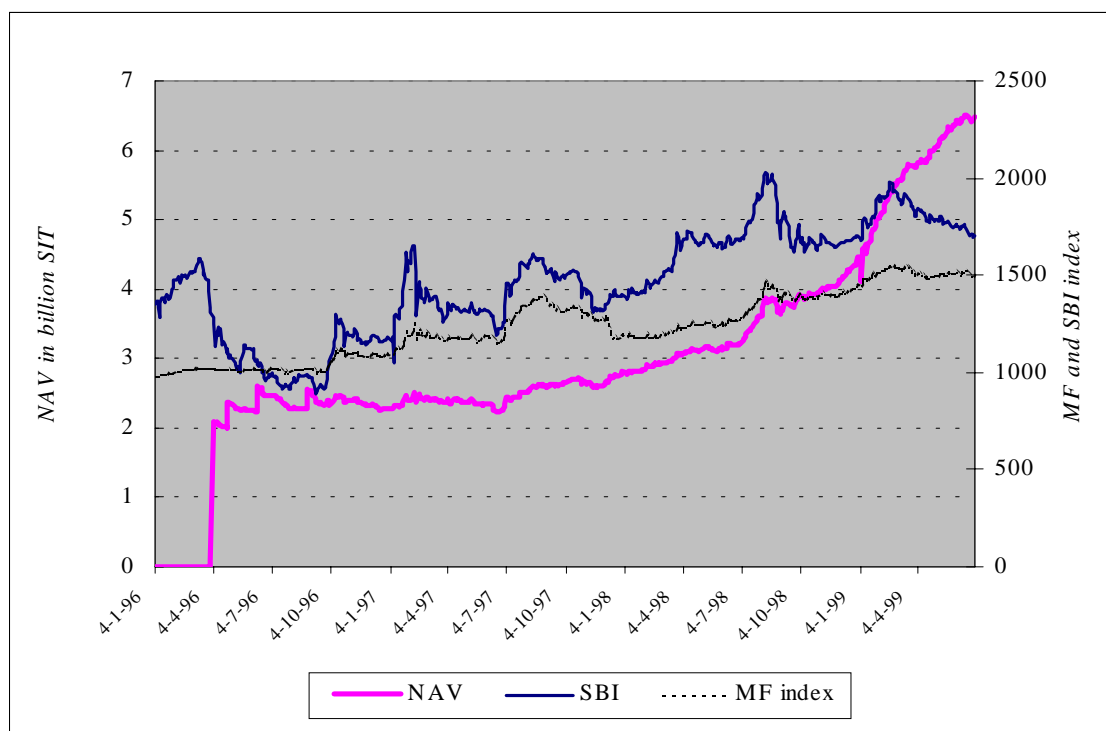


Figure 11: *Daily total net asset value of mutual funds and daily values of indices SBI and MF in the period January 1996-June 1999.*

is not surprising. In a few years, the results of a similar analysis might look very different, depending on the legal and organizational form that PIDs will choose, or be advised to adopt, in the coming year(s). Because of their larger asset base it is reasonable to assume that the money flows into 'future PIDs', if open-ended, may play a more important role for the organized equity market than current open-end funds did in the past two years. The opening of PIDs would almost automatically translate in a stronger presence of open-end funds on the Slovenian equity market.

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we look at whether net money flows to open-end funds have any impact on the stock market index SBI and its returns. We use the data from April 3, 1996 until July 31, 1999. We excluded the first three months of our above mentioned dataset because netflows were zero in this period. The first two days in April are excluded because there was a large net inflow of money into mutual funds due to the start-up of a few new funds. We search for the best specification of the model that can explain the variation in net flows of money to the open-end funds. We normalize net flows by dividing them by the total net mutual fund net asset value of the previous day. We use concurrent and lagged returns on SBI and lagged net flows and flows as a set of explanatory variables. Net flows and market returns, measured as the daily change in stock market index SBI, are positively correlated, but the correlation coefficient is rather low (+0.05). The first lag of net flows, the market return of three days ago, and the moving average term of the first order turn out to be statistically significant explanatory variables. Like Edelen and Warner (1999), we use the residuals of this regression, i.e. the unexplained, or 'unexpected' net flows as an explanatory variable in the regression for the daily percentage return on the SBI index. No matter what specification we use, the unexplained fund flows, their lags, and the lagged return on the SBI index do not explain more than 4% of the variation in market returns. Moreover, the regression coefficients of unexplained flows are statistically insignificant at the usual levels.

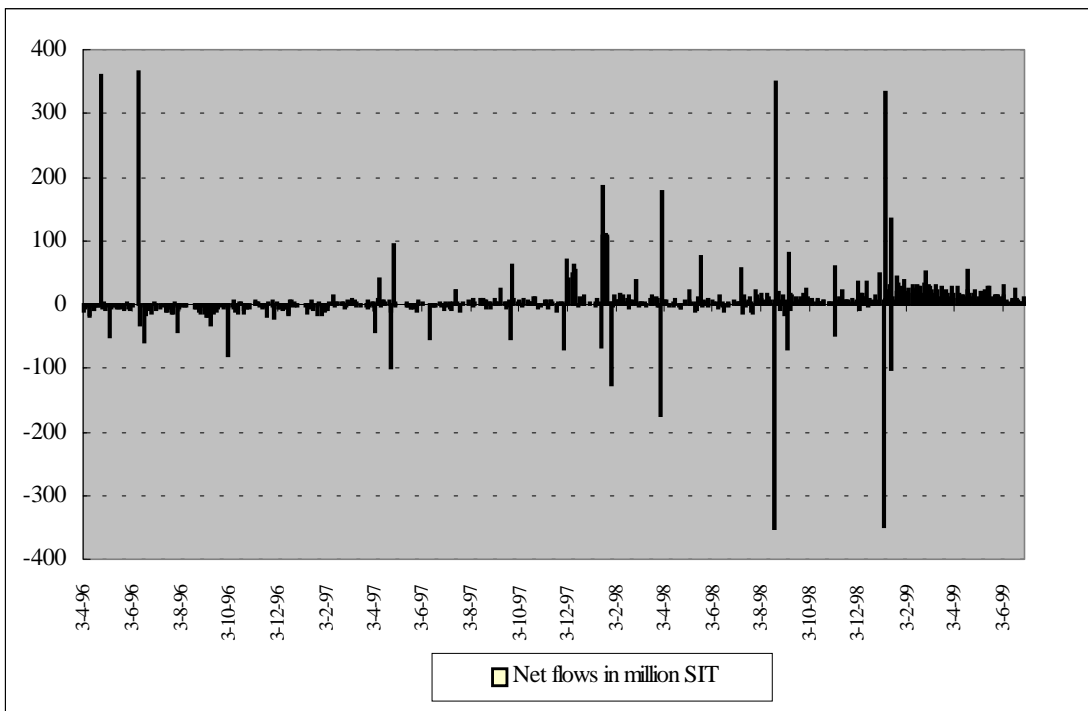


Figure 12: *Net flows of money into mutual funds in years 1996-1999.*