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Is Locking Domestic Funds into the Local Market Beneficial? Evidence from the Polish Pension Reforms

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Is Locking Domestic Funds into the Local Market Beneficial? Evidence from the Polish Pension Reforms

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Abstract

This paper is concerned with the effect of enforced home bias on the development of emerging stock markets. It provides a detailed study of the impact on the Warsaw Stock Exchange of the Polish pension fund reforms and the associated restrictions on international investment. The time path of market development for the Warsaw Stock Exchange is compared with a benchmark sample consisting of the other seven post-communist countries that joined the EU in May 2004. It is shown that benefits arising from the pension funds' increased investment in the home market are short-lived. In the long run, the relative performance of the Polish market returned to pre-1999 levels or worse, suggesting that enforced home bias on emerging markets may be detrimental, rather than beneficial, to the long-run development of the market.

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1. Introduction

Almost all governments and, in particular, those of developing countries, impose some restrictions on the portfolio composition of pension funds. In particular, tight limits are commonly imposed on international investment. This attitude is in stark contrast to the received wisdom of the financial literature, which suggests that such restrictions can have a negative impact on the efficiency of portfolio allocation. The empirical finance literature, however, has concentrated on the existence of home bias and its negative impact within developed markets. The impact of enforced home bias on the development of emerging markets has received almost no attention and consequently is less understood. However, as Roldos (2004) says, understanding the phenomena is "one of the key questions in emerging markets and one of the key challenges for regulators of securities markets and the pension industry". There are reasons to think that home bias may be detrimental for emerging markets and may have additional effects on these markets' development compared to their developed counterparts. For example, big institutional investors (and in particular, pension funds) may have far more effect on the development of an emerging market since, by nature, these markets are less liquid, less informationally efficient, and more prone to instabilities. One of the reasons that this issue has not been analysed empirically is that it is hard to find case studies that have two characteristics: (i) the volume of funds that are restricted need to be significant relative to the emerging home market and (ii) there has to be a relatively good set of benchmark markets at a similar stage of development so that the impact of the enforced home bias can be isolated. This paper focuses on an experiment that encompasses these two requirements. It looks at the development of the Polish stock exchange and compares it against the development of other emerging stock markets operating in Central and Eastern Europe in the period 1996-2004.

In 1999, as the result of the introduction of mandatory pension schemes in Poland, pension funds started to operate on the Polish market. From the beginning these funds faced strong restrictions on international investments. In consequence, the funds had no choice but to invest heavily on the local market and the equity investment of these funds quickly became significant relative to the overall size of the market (e.g., in 2003 the equity investment of the pension funds already represented 38% of all equity under free float on the Warsaw Stock Exchange, WSE).

To fully answer the question of whether pension funds' equity investments have a positive impact on the development of a stock market (in this case on the development of the WSE), the analysis needs to be conducted on two levels. First, the characteristics of the exchange over time must be examined in order to observe whether there are any differences in characteristics of the pre, and during pension

funds' investment periods. Second, to be able to fully isolate the effect and to abstract from other specific effects, as far as possible, the comparison must also be conducted on an international level. The "difference in difference" analysis aims to distinguish between changes that are characteristic to the Polish market and changes that characterise all the local markets at a similar level of development operating in a similar (local and global) economic environment.[1] Due to its geographical location, the economic transition experience and the current EU enlargement the Polish equity market can be compared with and contrasted against the equity markets operating in the other seven post-communist countries that joined the EU in May 2004. Therefore, the processes taking place on the WSE can be better understood than if the Polish data alone were analysed.

To give a foretaste of the main results, I show that the intensive investment of the pension funds in the local market had a strong short-term effect on the WSE. The market rose in absolute terms and rose against the benchmark markets. Standard measures of development (e.g., liquidity, interdependence with developed markets) also improved relative to the benchmark markets. However, I find no evidence to support the claim that the intensive investments of the pension funds have a permanent stimulating impact on the development of the WSE. In contrast, the market performance and measures of market development at best fall back to their original position in comparison with the other post-communist markets and one can make a case for suggesting that the relative position is worse at the end of the period than at the start. In summary, it can be said that if there is any long-term impact on the WSE it appears to be negative rather than positive. These findings support sceptical comments by Singh (1996), and Roldos (2004) on the negative impact of institutional investors on the development of underdeveloped markets.

The paper is organised as follows. Section 2 provides a brief literature review on the link between economic growth, development of the financial sector and institutional investors. It also discusses the potential arguments for and against the locking home capital investment onto domestic markets. Section 3 presents an overview of the pension reform in Poland and the main characteristics of the pension fund portfolios and the effect on the composition of the market. Section 4 presents our main empirical findings and Section 5 closes with conclusions.

2. Literature review and background

The linkage between economic growth, the development of institutional investors (including pension funds) and the development of stock markets has been

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[1] When the communist block fell apart several emerging markets were created at roughly the same time

studied by several researchers. Theoretical research stemming from the endogenous growth models of Lucas (1988) and Roemer (1989) suggests that financial institutions (including stock markets and pension funds) tend to stimulate economic growth as they increase the rate of savings/investment and improve efficient allocation of funds. However, empirical research documents a less straightforward relationship, with the deviations from the theoretical predictions being particularly prevalent in the case of developing markets (since they typically lack efficiency and transparency at different levels of market organisation and operation).

In general, there is strong evidence of a positive relationship between economic growth and the development of financial intermediaries in the case of developed countries, although there are different views on whether it is the development of a stock market that stimulates the development of financial institutions, or it is the financial institutions that enforce stock market development. Davis (1995) and Davis and Steil (2001) claim that the development of stock markets is a precondition for the growth of financial intermediaries, whereas Harichandra and Thangavelu (2004) document that "institutional investors significantly Granger causes stock market developments and economic growth", and, in particular, Granger cause increase in liquidity and turnover. Davis (2000) also analyses the OECD countries and comes to a similar conclusion that institutional investors play a positive role in the development of financial markets. Catalan et al. (2000) argue that "among institutional investors, contractual savings institutions are the most effective at developing capital markets". The study is based on a combined sample of several OECD countries, the USA, Canada, and a few emerging markets of Asia and Latin America. Demirguc-Kunt and Levine (1995) using a sample of 41 countries argue that the level of stock market development is highly correlated with the development of financial institutions, and pension funds, in particular although they do not try to determine which party is the stimulus.

Impravido et al. (2003a) argue that contractual savings institutions have a positive impact on the depth of stock and bond markets on average. However, the impact is nonlinear and is stronger in countries where (a) the financial system is market-based; (b) pension fund contributions are mandatory; and (c) international transactions in securities are lower. Impravido et al. (2003b) stress the role of the development of financial structures for the success of the pension reforms, especially in the case of small countries that cannot fully exploit economies of scale and scope in the provision of financial services. They warn that in such countries the financial sectors are too small to create competition and liquidity. The markets tend to be poorly regulated and burdened with high transaction costs. Furthermore, Singh (1996)

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and are thus at a very similar state of development as the WSE.

also strongly criticises the idea of investing in underdeveloped markets. He argues that relying on the (underdeveloped) stock markets as the driving force of economic progress can lead to disastrous results. He points out that a bank-based system should be strongly preferred to a stock market-based system for developing markets. He argues against the general trend (supported by the World Bank) towards developing a funded pension system in both developed and developing countries on the ground that "reforms may contribute towards undermining growth". Vittas (2000) claims that pension funds are neither necessary nor sufficient for capital market development. He stresses that advances in technology, deregulation, privatisation, foreign direct investment and, in particular, regional and global economic integration are the factors that determine development.

The literature, therefore, highlights the role of institutional investors (domestic and foreign) and the associated international portfolio management issue. Opinions on the role of foreign investors are also divided in the literature. For instance, Hagis (1998) argues that opening a local market to foreign institutional investors is beneficial for both local and foreign investors as it increases liquidity and decreases volatility. He argues that international investors enforce transparency, prudent regulation and monitoring on local stock markets. This in turn encourages local firms to go public and stimulates further development and growth of a local stock market. Vittas (2000) argues that the openness of a local market is one of the necessary preconditions for the development of a local stock market and success of pension reforms.

In contrast, Frenkel and Menkhoff (2004) argue that "activities of foreign investors in emerging economies (…) are not simply positive for these countries but also can exert adverse effects". They argue that foreign (less informed) investors may have a strong negative impact on the relative position of local investors as "they are likely to amplify occurring imbalances or even trigger financial shocks". To avoid, or at least to minimise, such situations the authors propose that local investors should be encouraged to internationally diversify their portfolios. That is, not only should foreign capital come to a developing country, but also a developing country's capital should be invested on international markets. Roldos (2004) also postulates "a gradual but decisive loosening of restrictions on equity and foreign investments". He argues that locking assets on a local market may lead to price distortions, bubbles and concentration of risk. Impravido et al. (2003b) also warn that new policies "should not be constructed as an argument for maintaining a closed capital account and to prohibit pension funds from investing overseas". Restricting capital flows may lead to mispricing of domestic assets. In practice, however, "home bias", even if there are no restrictions on foreign investments are a common phenomenon. (e.g., Kang and Stulz, 1997; Lewis, 1999; Warnock, 2002).

Several economists (particularly those associated with actuarial industry) argue that pension payments are bond-like in nature, and therefore pension funds should not take risks with the sponsoring company's shareholders' funds. Pension funds should abandon the idea of international diversification and even intra-domestic diversification should not be implemented. Pension funds should heavily, or even completely, invest in government (domestic) bonds (see e.g., Bodie, 1995; Exley et al., 1997; Bader and Gold, 2003). However, even if such investment strategies fulfil the duty towards financing government debt, they do not make the investment safer or even profitable enough to cover pension funds' liabilities. Furthermore, it is not even clear that it has a positive impact on the development of domestic stock markets in the short and long run, and, in consequence, on the economic development of a country.

Taking into account that local markets of developing countries are very often small and do not offer sufficient investment opportunities, it is very likely they do not guarantee the efficient transfer of funds that is necessary for economic development. Pension funds, and their contributors, cannot benefit from local investment policies if neither investing in bonds (mainly government, a corporate market is often in an embryonic form) nor shares of local companies offer a sufficient rate of return. Investing in bonds gives very limited earning opportunity, especially if the demand for bonds grows more rapidly than the net supply of new issues.[2] Moreover, the number of shares is limited, and a major injection of the vast amount of money that pension funds have at their disposal into a market could lead to a price bubble. Obviously, such disequilibrium may mean low real returns, if any, in the medium and long run. Moreover, as emerging markets typically reflect the industrial specialisation of a country, which is often limited to a few industries, the risk of concentrating equity investment in a local market can be high. In addition, if a local market is dominated by pension funds, it leaves very little room for other domestic investors (institutional and private), and, in particular, for international investors. As Frenkel and Menkhoff (2004) point out, crowding out international investors and placing them in the position of less informed market participants can scare them away and hamper the local market development in the long run. Despite all these potential shortcomings local governments do not seem particularly interested in opening borders for financial flows, and even if they do not restrict international investments, they do not stimulate them either.

In the light of the above, it is clearly important to improve our understanding of whether institutional investors, and pension funds in particular, do indeed stimulate

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[2] For example, the change in pension regulation following the Maxwell financial scandal in the late 1999 forced the U.K. pension funds to invest in the gilt-edged stock and significantly reduced the rate of return for a period of time. A more recent shift in the portfolio allocation of the U.K. pension funds

local market growth or whether they represent a potential threat to market development. If the emergence of "locked-in" pension funds and their vast contributions stimulate local market growth, then one should observe a long-term improvement in market properties and characteristics. In particular, physical growth of the market through an increase in the market capitalisation, number of listed securities, higher liquidity, higher turnover, improvement in market efficiency and higher integration with other markets (especially developed markets) should be observed. However, if the institutional investors do not help markets to develop, then their investment might have, at best, a short-term impact on the market.

3. The Polish pension reform

Discussion of the reform of the Polish social security system began shortly after the 1989 parliamentary election. However, progress was slow and it was only in 1999 that the alternative schemes to PAYG (with the associated new institutions and rules of contributions and benefits) started to operate. In particular, a compulsory and funded scheme serviced by pension funds was introduced.[3] Initially, the Superintendence of Pension Funds (UNFE) licensed 21 Open Retirement Funds (OFEs).[4] As a result of several takeovers and mergers only 15 funds were in operation by December 2004, i.e., when this analysis ends.

The market is dominated by three funds (CU, ING NN and PZU) that held over 64% of the market share of assets under management (AUM) at the end of 2004 and 55.3% of the total 12m contributors to OFE's. The four biggest funds (the three just mentioned and AIG) control nearly three-quarters of all AUM. This market structure has been steady since 1999.

The popularity of the compulsory saving scheme has surprised even its creators. 85% of entitled workers chose to transfer their contributions to newly established pension funds.[5] However, Szumlicz (2001) argues that the broad acceptance of the pension reform has not resulted in a thorough understanding of the new system itself. He argues, based on survey results, that only just over half of the population know that pensions strictly depend on personal contributions. Research conducted by the Polish syndicate *Polish ARC Rynek i Opinia* (2002) shows that 70% of those polled have never checked their account balance in OFE's. Consequently, for most contributors, the pension reform is incomprehensible.

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that resulted from the world-wide decline of equity markets in 2000-2003 resulted in an increase in the demand for the local government bonds and further suppressed the yield lowest for last 100 years.

[3] This scheme is called Pillar 2, in contrast to the reformed PAYGO that is Pillar 1. In addition, Pillar 3 based on voluntary contributions has been introduced.

[4] The functions of the UNFE were taken over by KNUIFE in April 2002

[5] Only workers 50 years old or younger could participate in the new pension system when it was set up.

In its monitoring role KNUIFE tries to protect all those uniformed and informed contributors by imposing rules on what pension funds can do with the collected contributions and, in particular, how much return is expected. The OFEs are required to obtain a return that is at least half of the (market share weighted) average return of all the funds.[6] When the investment performance is to be measured, i.e., reaching the end of each quarter, OFE's tend to defend their positions by limited portfolio adjustments (Schroder Salomon Smith Barney, 2003). With the concentration of the AUM in just a few funds, it is obvious that it is the few that determine the average to a high degree. Since small funds have a greater chance to be penalised if they underperform, they tend to follow the dominant funds. Voronkova and Bohl (2003) detect strong herding behaviour (measured by correlation in trading) and, in particular, feedback trading (past returns affect current demand for assets) by Polish pension fund. The effect is much stronger on the Polish market than on developed markets. This behaviour may result from the inexperience of funds managers, penalties' structure, high concentration of funds, as well as relatively limited investment opportunities.

Restrictions imposed by the KNUIFE also determine what assets and markets OFEs can invest in. Although the Polish regulator allows pension funds to allocate up to 50% in local equities (40% in companies listed on the WSE and 10% in shares of National Investment Funds, NIFs), it puts high quotas on the fraction of assets that must be held within the Polish borders.[7] In particular, no more than 5% of total assets can be invested on foreign markets.[8] In comparison, on the neighbouring German market restrictions on equity investments and foreign investments are the same, 30%.

3.1. Pension funds – new but sizable investors

By the end of 2004, the OFEs held over \$11bn and CA~IB Securities (2004) estimate that the AUM value would have been 25% higher if it were corrected for unpaid contributions to the funds. It has been estimated that the steady cash inflow will increase the AUM to PLZ200bn by 2009 (or about \$64bn at the constant exchange rate of December 31, 2004).[9] The (percentage) decomposition of the OFE's portfolios is stable over time. From the start T-bonds and bills, and equities traded on the WSE are the main two groups of assets acquired by the OFEs. Investment in these assets amounts to 95% of all the invested money. Shares account for about one-third

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[6] If a return is more than 50% or four percentage points below the average performance of all funds, a fine is imposed and paid by the pension fund to the workers' plan.
[7] NIFs have been created as the result of mass privatisation.
[8] In 2002 this limit was increased for the EU assets.
[9] It is important to realise that the funds will not face any cash outflows until 2009, when the first pensions have to be paid out.

of the invested AUM. Within the equity group the proportions that are allocated to individual sectors are also stable over time: the financial sector, or in fact, the banking sector, absorbs about 30% of the money, the industrial sector attracts slightly above 40% (with chemicals contributing to nearly half of the share) and the remaining nearly 30% belong to the service sector where a single telecommunication company (PT SA) takes almost a half of it.

Although as a proportion of the AUM the equity investment is stable over time, in nominal numbers it has grown rapidly driven by the inflow of contributions and the growth of the share prices on the market. At the end of 1999 the total value of the OFEs' equity portfolio was just $0.17bn. By the end of 2004 it exceeded $6.6bn, i.e., it grew by nearly 3,800% in dollar terms.[10] During the same period the WSE main market index, WIG, rose 53%. A simple comparison of the growth rates indicates that the OFEs position in the market has grown substantially since 1999.

The WSE is a small market and as such has rather limited investment opportunities. Although there are more than 200 stocks to choose from, most of them are small both according to international and Polish standards. Indeed, the S&P IFCI index constructed for the Polish market includes only 25 companies of which eight are banks. Furthermore, the 13 biggest companies constitute as much as 95.9% of the international Morgan and Stanley MSCI index constructed for the WSE, with just three top companies contributing 64.8% to the index. The same 13 companies are also heavily weighted in the two main Polish indices, WIG and WIG20. Their weights sum to 67.5% in WIG and to 85% in WIG20.

The OFEs' equity portfolios are heavily biased towards these local "blue chips". Moreover, since there are just a few big companies, all or nearly all, of the funds invest in them. Investment in the five companies chosen by all the funds contributes as much as 33.8% to the total OFE's equity portfolio. Moreover, there are 51 stocks (i.e., one-third of all stocks included in the OFE's portfolios) that are chosen by at least half of the funds. These stocks constitute nearly 62% of the total pension funds' equity portfolio (see Table 1 for more details).

The investments in the biggest companies not only absorb a high proportion of the OFEs money, but also a high proportion of the shares in free float. Obviously, individual medium and small size enterprises absorb smaller proportions of the OFEs' money, but although investment in these companies is less concentrated (i.e., a smaller number of funds invests in individual companies), it does not mean that the free float of these companies remains unaffected. Quite the contrary. If all the companies that have been invested in are separated in quartiles according to their market capitalisation, then for the highest quartile the average free float taken over by

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[10] In PLZ terms the equity investments grew by nearly 3000% from PLZ0.69bn to PLZ20.7bn.

the OFEs is 36.4% and the average number of funds investing in individual companies in this quartile is 11.4. For the second quartile, the corresponding statistics are 27.3% and 6 funds, and for the third quartile, 28.2% and 3.6 funds. Finally, for the lowest quartile (comprising of the smallest companies on the market) the average share of the free float is 26% while on average there are only 2.6 funds that invest per company.[11] The standard deviations for the above averages are relatively high, about 20% for quartiles one and four and 16.6% and 19% for quartiles two and three. However, what is important is that, although the capitalisation of companies differs dramatically between quartiles (and in particular between the first and the fourth), and the average number of funds investing in individual companies declines with capitalisation, the average proportions of free float taken over by the OFEs are similar across quartiles. The pension funds have acquired more than 50% of the free float in the case of 20 companies, and more than a quarter of the free float in 68 companies.

To illustrate this point Table 2 shows the 20 biggest and the 20 smallest companies (market capitalisation is the criterion) that pension funds have invested in.[12] For each company the market value, the number of OFEs that have stakes in the company and the market specialisation of the company are provided (statistics as of December 31, 2004). Table 2 confirms the earlier observation that the OFEs are attracted to the biggest companies on the market and these predominantly represent the banking industry. Less concentration of funds can be observed among the smallest companies. However, here, although fewer OFEs have acquired shares of individual companies, the amount of shares left in free floatation is also substantially reduced by the OFEs' investment.

There are already signs of "overcrowding" caused by the pension funds' investments. As OFEs' own more and more shares, less and less is left for other investors. Fig. 1 shows the number of individual investment accounts over the period 1995-2004. It is clear that until 1998, i.e., before the pension funds entered the market, the number of accounts grew from year to year (in total about 50%). However, the trend reverses after 2000, and by 2004 the number of accounts is similar to that recorded ten years earlier. In addition, the share of individual investors in total turnover has declined from 55% in 2000 to 36% in 2004.

The OFEs already face limited exit opportunities and portfolio adjustments are difficult (liquidation of big holdings in a company is difficult without affecting the price, especially when the liquidity of the market is low). Indeed, the OFEs' adjustments of the existing share allocations tend to have a rather "cosmetic" character. Companies once chosen are rarely excluded from the portfolios and those

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[11] Investments in NIFs and foreign stocks listed on the WSE are not included in these statistics due to the lack of information on their free-float.

[12] For the sake of space we do not present full quartiles that have 32 companies each.

excluded from initial portfolios are rarely added latter. Since investment in the selected shares is already large, the pension funds have turned their attention towards new offerings. It has become standard for the OFEs to take significant stakes in new listings. For instance, the proportion of the free float of GTC and Plast-Box (both joined the market in 2004) absorbed by the OFEs is 63.8% and 51.7% respectively (see Table 2). The tendency to include big proportions of new listings is surprising given that the Polish new offerings have a rather poor performance from date of listing.[13]

Finally, Fig. 2 demonstrates that the performance of the OFEs' equity portfolios closely resembles the performance of the main market index, WIG. During the first two years of OFEs' operation (i.e., in 2000 and 2001) pension fund managers were able to outperform the market, but the ability to choose best performing stocks stopped in 2002. Since then returns of the OFEs portfolios closely replicate returns on the market index. The increasing similarity between the return on WIG and the return on the equity investment of the OFEs is a reflection of the large presence of OFEs in the market.

3.2. Movement in the WIG

Fig. 3 presents the monthly movement of the WIG index in nominal and real (i.e., CPI adjusted) terms in the period June 1996-December 2004. The initial value of the index is normalised to 100 for easier reference. In the period mid 1996-mid 1999 only the Russian Crisis of 1998 seems to have a dramatic impact on the index, but within a next few months the index recovers to its pre-crises level. Mid 1999, however, shows a sharp increase in the WIG value. The index remains high for a few months and subsequently declines to values even lower than these observed in the mid 1996–mid 1999 period. It is only in 2003 that an improvement on the market and a sharp increase in the WIG value can be observed. The CPI adjusted index has a similar pattern although its values are much lower. However, the time-pattern of the index remains unchanged when adjusted for CPI: the 1999 increase and the subsequent decline in the period 2000-2002 are clearly visible.[14]

The primary analysis in this paper is conducted using a difference in difference analysis since this helps control for effects that are common to all local markets but, before doing so it is interesting to address two questions using purely domestic data. First, is the observed pattern of the market performance consistent with our argument

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[13] For instance, Zalewska (2006) reports that the average return on the IPOs' shares selected by OFEs in 2004 was -2.7%.

[14] It will be shown in Section 4.2, that the performance of the index at the end of the sample period is not so impressive when compared against indices of the other stock markets operating in the region.

of the impact of the OFEs' equity investment timing, and second, could this have been explained by other factors, e.g., macroeconomic or international?

The evidence presented above does indicate some effect in 1999/2000. The fact that the WIG increases before the pension funds start operating may seem to contradict our argument that this increase is caused by pension funds. However, as many financial studies show market expectations are powerful drivers of market behaviour (e.g., Binder, 1985; Grout and Zalewska, 2006). Therefore, if market participants expected that pension funds would start investing in Polish equities (and this is likely given the advance in the pension fund legislation in 1998-1999), the expectations of higher demand for equities might well drive prices up before the actual investment by pension funds took place. The decline in the WIG index in 2000-2002 may have several sources. It may reflect the fact that the share already acquired by the pension funds was so significant that it negatively impacted on the price formation processes but could be caused by other sources, e.g., changes in inflation, GDP, privatisation proceeds, etc. However, this does not seem to be the case. The correlation of yearly GDP and the end-of-year WIG index values (both CPI adjusted) is only 0.099 whereas the correlation of the WIG returns and the GDP growth rates is –0.24.[15] Moreover, the correlation of one year lagged returns on the WIG index with the GDP growth rate is only 0.14 showing that the view that stock markets performance can be an indicator of the future economic strength of the country does not help to explain the changes in WIG. In the light of this, it can be concluded that the business cycle cannot explain but a small part of the pattern observed on the WSE.

It is commonly known that the speed and magnitude of privatisation have significant impact on the growth of a stock market. This argument is particularly relevant in the case of the post-communist countries, where nearly 100% of listings are the result of privatisation proceedings. Although not all privatised companies are listed on the stock market, it is natural to enquire if the magnitude of privatisation proceedings is correlated with the raise of the market. If the increase of 1999 and the subsequent decline in the market index is the result of privatisation taking place on the Polish market, then the increase in the market index should be related to the magnitude of privatisation. However, the correlation of the yearly change in the market index and the yearly change in privatisation proceedings is just –0.015.

The above statistics demonstrate that the performance of the WSE is not purely explained by the domestic economic factors. This leaves scope for the investigation in the next section, which compares the performance of the WSE with the performance of the other emerging markets of the region.

4. Difference in difference analysis

As indicated in the Introduction, to fully isolate the effect of the pension reforms while abstracting from the other specific effects, as far as is possible, a "difference in difference" analysis between the WSE and a chosen benchmark group of markets will be conducted. Due to its geographical location, the economic transition experience and the current EU enlargement the Polish equity market can be compared with and contrasted against the equity markets operating in the other seven post-communist countries that joined the EU in May 2004. In addition, although all benchmark countries have initiated pension reforms during the period investigated in the paper, none of the corresponding equity markets experienced an increase in the equity holdings of domestic institutional investors to the scale observed on the WSE.[16] Therefore, the seven stock markets create a diversified but consistent benchmark (see Appendix 1 for details).

The data are collected from local websites, DataStream, EBRD reports and direct contacts with stock exchanges. Equally weighted averages of the relevant statistics across all benchmark markets are constructed. This allows to contrast the Polish figures against the "regional" figures. The average across all seven exchanges is referred to as "EU-CEE". The differences between the Polish and the EU-CEE average figures are denoted simply as "difference". However, if not all exchanges are used, I refer to individual exchanges by the name of the country rather than the name of the stock market or its index. Comparison of market indices is performed on a monthly bases when CPI adjustment is discussed (Section 4.2) and on a daily bases when autocorrelation and integration with the developed markets is studied (Section 4.8). All other statistics presented in Sections 4.3 – 4.7 are annual.

Finally, for the market integration analysis, daily data from the biggest European stock exchanges, i.e., from the London Stock Exchange, Frankfurt Stock Exchange and the Paris Burse, and the New York Stock Exchange are used.

4.1. Choice of the benchmark sample

Since the first effects of the Polish pension reform of 1999 are expected to coincide in time with the last and "hottest" years of the preparations for EU Enlargement, the benchmark is needed to disentangle these two effects. Therefore, the

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[15] GDP statistics are taken from the EBRD Annual Reports. As the GDP deflators were not available, CPI index was used for the adjustment purposes.

[16] A limited impact of pension funds investments on equity markets in the benchmark markets is a result of (i) low participation rates, hence smaller amounts of money accumulated by pension funds, (ii)

choice of the seven 2004 EU Entrants seems obvious and appropriate. Even if the countries/markets differ significantly in size and structure, they can be expected to have many common characteristics. To fulfil the EU entry conditions the candidate countries had to coordinate many policies. Many of these policies were aimed at providing satisfactory economic growth and, in consequence, were likely to impact on the behaviour of stock markets. In addition, if there were any other international trends that happened after 1999 (e.g., post e-commerce bubble phenomena) it is likely that on average the markets of the region responded to them in a similar way. By contrasting the Polish statistics against the EU-CEE averages, any "regional" trends should be separated from "purely" post-pension reform effects.

Before the formal comparison of the statistics is performed, it is worth noting that the WSE is generally perceived as one of the most successful stories of financial market creation experienced in the post-communist countries of the region. Although Poland is not the richest country of the region it is as big as the all other seven countries put together by population or nominal values of GDP. The number of companies operating in Poland, and their average size provide a good starting point for the development of a stock market. These "natural" conditions married with gradual privatisation and a strict approach to implementation of regulatory structures are factors that have impacted positively on the market evolution. When, on 16 April 1991 the WSE opened for its first trading session the shares of only five newly privatised companies were under offer. By the end of 1991 nine stocks were listed with capitalisation of US$0.15bn (less than 0.2% of GDP). By the end of 2004 there were 230 equity listings with total capitalisation of US$97.6bn or 31% of GDP. In the period 1991-2004 the number of effectively listed stocks grew over 40 times,[17] capitalisation increased over 600 times, the exchange moved from one trading session per week to five sessions and from one price quotation system to continuous trading. The organisation and regulation of the Exchange is also highly regarded (see for example, Glasear et al., 2001).

In contrast, other stock markets of the region had more dramatic ups and downs with the crash of the Prague Stock Exchange in 1996-97 being one of most famous. In general, the exchanges of Prague, Budapest and Ljubljana are the biggest and most dynamic, although the Prague SE is finding it hard to bounce back after the post-mass-privatisation crises. The three Baltic States' markets are very small but thanks to their close cooperation with each other and the neighbouring developed markets (Oslo, Helsinki) they are slowly gaining momentum.

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low equity investments of pension funds (e.g., in Hungary, a country with one of the biggest pension industry equity investments are about 7-8% of total money invested).

In summary, the WSE should be well placed in comparison to the smaller markets. If intensive equity investments of the pension funds have had a positive impact on the market's development, the advantage of the WSE should be growing over time.

4.2 Comparison of the market indices

Fig. 4 presents the time-path of the difference between the WIG index and the equally weighted index calculated using the main stock market indices available for the benchmark markets. It also shows the difference between cumulative average returns, CARs, obtained for the CPI adjusted WIG and the equally weighted, CPI adjusted, index of the EU-CEE markets. The comparison starts in June 1996 when the indices from the Baltic States start. As in Fig. 3, monthly observations are employed and the initial values of the indices are normalised to 100 for easier comparison.[18]

Fig. 4 documents clearly that the time pattern of the relative performance of the WSE over the other markets of the region is not sensitive to changes in inflationary pressure. Both the nominal and the CPI adjusted values of the indices show that the WSE outperforms the EU-CEE markets in the period 1999-2001 only. The effect is even more pronounced when the CARs are used.

To summarise, neither Polish economic conditions or trends on the benchmark emerging markets can explain the absolute and relative increase of the Polish stock market index in the months surrounding 1999, i.e., the period when the pension funds started to operate. From the Polish data alone it can be concluded that the "boom" had already started in early 1999. This could be a reflection of growing expectations about future share price rises as the result of the increase in demand for shares. The comparison with the international markets suggests that the "superiority" of the WSE continued well into 2001. However, although Fig. 3 indicates that 2003 and 2004 are years of relatively good performance for the Polish market, the international comparison does not confirm it. That is, although the WIG was improving in absolute terms, it was improving less rapidly than the EU-CEE average index. Fig. 4 clearly shows the underperformance of the WSE in 2003-2004.

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[17] If delistings are taken into account the total amount of companies listed on the WSE would be approximately 50% larger.

[18] The mid-month observations have been chosen to avoid any impact of beginning/end of month effects. A similar exercise was performed for different adjustment techniques. The results remained

4.3. Stock market development measures

To assess whether a particular market has developed over time and how it compares with other markets both academics and practitioners look at changes in: (1) market size, (2) liquidity, (3) volatility, (4) market concentration (5) efficiency of pricing and (6) regulatory and institutional development. Each of these market characteristics can be measured in several ways. Generally, the different measures complement each other since none of these measures alone provides an absolute way of measuring market development. When it comes to a comparison across markets it is even less obvious, which are the best measures and how they should be interpreted.

The general perception is that as a market develops and gains credibility and trust it attracts more companies willing to be listed on it and investors willing to invest in the assets offered. Therefore, *market size* is expected to be positively correlated with the ability to mobilise capital and diversify risk, and hence with market development. Market size is traditionally measured by the ratio of market capitalisation to GDP and by the number of stocks listed on the exchange. Both measures are convenient when analysing a time pattern of changes, however, they must be approached with caution when different markets are compared. This is because the simple fact that, for example, one market, say A, offers four times as many stocks as market B does not ensure that market A is (four times) more developed than market B. To illustrate this point, the fact that there were over 1600 listings on the Prague Sock Exchange in 1996 does not ensure that the Czech exchange was as sophisticated as the London Stock Exchange at that time.

Market liquidity is often understood as ability to sell and buy when requested. It is often measured as the ratio of total value traded to GDP, or, alternatively, as the ratio of total value traded to market capitalisation. It complements the ratio of market capitalisation/GDP, but again declines and rises do not automatically indicate that there is more or less trading since GDP may have changed, too. As in the case of market size measures, it is typically taken that market liquidity is positively correlated with market development.

In contrast to the above measures, *market volatility*, measured by variance (or standard deviation) of returns, is believed to be negatively correlated with market development.

Since a small number of stocks to choose from results in a lack of diversification opportunities, high *concentration* of assets (defined as the dominance by few stocks in the market) is perceived as a negative feature. Demirguc-Kunt and Levine (1995) use

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unchanged whether the adjustment was done for country specific deposit rates (another way of calculating real returns) or presented in the US dollar terms.

the ratio of capitalisation of the10 largest companies to the total market capitalisation as a proxy for concentration and I follow this lead.

Efficiency of pricing, although intuitively obvious, is one of the most difficult measures to assess. Formally, to quantify whether an asset is fairly priced by a market requires knowledge of the fair price. When the true value of the asset is not know, any departure from the "believed" true value may be due to market inefficiency in pricing but may also be due to the incorrectness of estimates (as a result of the wrong asset pricing model at our disposal or our individual error). There is a variety of tests for market integration that make an attempt to assess whether assets traded on different markets are equally priced. However, since tests based on asset pricing models have low explanatory power in the case of emerging markets (see e.g., Bekaert and Harvey, 2002; Bekaert et al., 2005), Schotman and Zalewska (2006) propose to go beyond the concept of asset pricing and test for co-movements of markets. I follow this lead.[19]

Finally, regulatory and institutional development can be assessed via comparison of legal structures, price and information disclosure mechanisms, protection of small shareholders, etc.

For the purpose of this paper, i.e., to obtain an assessment of the relative development of the Warsaw Stock Exchange over 1999-2004, the first five measures are discussed since these are of quantitative nature. The data is presented at two levels. First, the development measures over the period are given for the WSE. Second, and the main purpose of this section, these development measures are compared to the development measures of the stock markets operating in the post-communist countries that joined the EU in 2004.

4.4. Market size

In a healthy environment a stock market is typically expected to grow over time. The growth can occur via an increase of the number of listed stocks, via an increase in the value of stocks, or both. In a transition environment, however, the physical growth of the exchanges has generally been the result of a particular policy (i.e., privatisation) rather than the natural desire of managers to make their firms publicly traded.

Fig. 5 shows that the WSE is large compared to the average of the other markets of the region, so the potential diversification effects may be greater on the WSE. Although the number of listings has not increased since 1999, i.e., since the pension funds started to operate, it has not substantially declined as happened on the

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[19] In the further part of the paper I use the word "integration" in the broader sense, i.e., call two markets integrated in they co-move.

benchmark markets.[20] This however, should not be interpreted as a direct success of the pension reform and its positive impact on the business climate. Behind these numbers, as already mentioned, are hidden direct policies of individual governments. Poland has an ongoing privatisation programme, hence, it is natural to expect that the number of listings will grow over time. On the other hand, most of the benchmark countries have completed their privatisation programmes (with an exception of utilities).

Fig. 6 shows a more informative measure of market size, i.e., the ratio of market capitalisation to GDP. It is apparent that the ratio calculated for the WSE does not grow over time, save for a single jump in 2004. The dramatic change in the Polish market capitalisation to GDP ratio for 2004 is in part the result of the general upward trend in stock market prices that was observed that year. However, this trend cannot fully explain the relative improvement of the WSE's market capitalisation to GDP ratio when compared to the EU-CEE average. This is because the price rise in the benchmark markets was even stronger in 2004. The reason that the market capitalisation to GDP ratio increases more on the Polish market than on average in the benchmark markets is that, in contrast with the benchmark markets, the WSE had many new listings (36 in total, i.e., nearly 18% of the total number of listings). This increase in the number of listings is mainly exogenous to market conditions being the result of the privatisation programme. Therefore, the 2004 rise in the market capitalisation to GDP ratio cannot be attributed to the pension reform effect.

In order to evaluate the impact of pension funds' investments we therefore have to concentrate on the fluctuations in the market capitalisation to GDP ratio in earlier years. The capitalisation to GDP ratio increases in 1999-2000, this corresponds to the increase in the WIG index during these years (see Fig. 3). However, this rise in the market index only brought a short-lived improvement in the statistics (both in absolute terms and relative terms). The difference between Poland and the EU-CEE average is positive for 1999 and 2000. Over time the difference changes in favour of the benchmark countries. Overall, based on these statistics it cannot be concluded that the Polish market grows faster over time and nor that has grown more than the benchmark markets since the pension funds started to invest in equities.

4.5. Market liquidity

Figs. 7 and 8 complement Fig. 6. The total value traded to GDP and the total value traded to market capitalisation ratios display a very similar pattern to each other

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[20] The 1997-1998 decline in the number of listings of the benchmark group is driven by the creation of a three tier listing system on the Lithuanian stock exchange, and a subsequent shift of over 500 companies out of the main list.

and with the time pattern of the ratio presented in Fig. 6: the highest ratios are in 1999-2000, as are the differences between the Polish market and the benchmark markets. However, the highest peak is in 2000, not 1999. This can be explained by the volume of trade that took place when pension funds actively entered the market in 2000, whereas the increase in prices of 1999 may be attributed to rising expectations about such entry.

The differences between the Polish and benchmark markets show that the Polish market was, on average, more liquid than the other EU-CEE markets if one looks at the ratio of total value traded to market capitalisation (Fig. 8). However, this advantage decreases sharply over time.

4.6. Market volatility

Fig. 9 presents volatility of the WIG index measured as the standard deviation of daily returns for each calendar year, and the difference between this and the average of the standard deviations of daily returns calculated for each of the benchmark markets. Two lessons follow from it. First, the volatility of the Polish market declines over time, with the exception of year 2000. Second, the Polish market is persistently (except for 2002 in the most recent years) more volatile than the benchmark markets. The greatest difference is in 2000.

It should be stressed that the higher volatility of the Polish market relative to the volatility of the benchmark markets cannot be explained by the diversification effect since the benchmark market volatility is obtained as the average of volatilities calculated for each of the markets, not as the volatility of the portfolio obtained as the combination of individual market indices.

To summarise, the comparison of the Polish versus the benchmark volatility does not indicate a relative improvement of the WSE after 1999. Therefore, the underperformance of the WIG index (as reported in Fig. 4) in the period 2001-2004 cannot be attributed to comparatively lower risk. If the returns presented in Fig. 4 were risk adjusted, the WSE's underperformance would be even more apparent.

4.7. Market concentration

Following Demirguc-Kunt and Levine (1995) the ratio of capitalisation of the ten largest companies to total market capitalisation is used as a proxy for concentration. Estonia and Lithuania are excluded from the statistics because of the lack of data. Again because of the lack of data, the 1997 and 1998 figures do not include the Slovak market. Fig. 10 presents the results.

The concentration figures of the WSE are relatively stable over time with a decline observed in 2003. Concentration ratios for the Polish market are much lower than for the comparative market average. This, in part, reflects the fact that the number of companies listed on the benchmark markets has decreased over time, whereas on the Polish market moderately increased.

4.8. Efficiency and Integration

Pajuste et al. (2000) and Mateus (2004) provide some discussion of how predictable the emerging stock markets of CEE are. Although the results obtained for individual countries differ between the two papers, both of them find that the stock markets are highly predictable, i.e., inefficient. The level of integration is low, particularly for Poland and Hungary.

However, as many authors argue, asset pricing models (the core of many studies on mispricing and integration) are not very well suited for studies on the properties of emerging markets (see, e.g., Bekaert and Harvey, 2002; Bekaert et al. 2005). The departure of the properties of real-life time series from theoretical assumptions and the dynamic processes taking place on emerging markets may be responsible for such a situation. To sidestep the problem Schotman and Zalewska (2006) propose a test that goes beyond an asset pricing relationship and focuses on a co-movement of markets. In this test, returns on an emerging market are regressed against its lagged values (giving an autocorrelation coefficient) and returns on a selected developed market (giving, so called, an "impact coefficient"). The integration is assessed both by the size and significance of the estimated coefficients (that vary over time) and variance ratio (VR) that measures the total variation of the emerging markets returns that can be explained by the returns on a developed market. If investigated markets become more integrated over time, the impact coefficient and VR should increase and the autocorrelation coefficient should decrease.

In this study the Schotman and Zalewska (2006) test is applied using returns on the WSE and returns on the EU-CEE exchanges as dependent variables. Returns on the developed markets of the EU (UK, France and Germany) and the US markets are the independent variables. Changes in the coefficients and VRs are analysed at two levels. First, the issue of whether predictability and interdependence of the Polish stock exchange with developed markets changes over time is addressed. Second, the relative position of the WSE in comparison to the EU-CEE markets is analysed. If since 1999 the WSE developed faster that the neighbouring emerging markets, then the relative and absolute differences between the predictability and interdependence of the markets should increase in the last few years.

Fig. 11 presents the results for the efficiency component of the test. The results are given for the UK regression.[21] It is clear that the autocorrelation of the WIG index declines in 1997-1999 period. In 2000 the autocorrelation coefficient starts increasing again, and in 2001 it again becomes statistically significantly different from zero. It declines in 2002 and remains statistically insignificant from this time. However, the lack of significance at the end of the period may result from the estimation technique (the Kalman filter tends to have higher confidence intervals on the start and end of the sample). The 2004 level of the autocorrelation coefficient is very close to its 2001 peak.

The comparison of the differences (yellow line) shows that the Polish exchange is characterised by higher autocorrelation at the beginning of the period but the difference changes in favour of the WSE by 1998. However, during the initial period of the pension funds' market activity the (statistically significant) autocorrelation of the Polish market rises to the average autocorrelation level of the benchmark markets. In 2004 the Polish market seems to have a similar level of autocorrelation to the other markets (the yellow line approaches zero again).

Fig. 12A-D presents time-paths of the impact coefficients estimated for the Polish market in the regressions against each of the developed markets (blue lines) and the difference between these estimates and the average of the estimates for the benchmark EU-CEE markets (yellow lines). Fig. 12E shows, in one graph, the four time-paths of differences presented in Fig. 12A-D.

The picture arising from Fig. 12 is clear. The Polish market, on average, is more responsive than the benchmark markets to news coming from developed markets. This sensitivity is similar across the four developed markets. The highest values of the impact coefficient, in levels and differences, are estimated for 1998 and late 1999 - early 2000. The 1998 spike can be attributed to the Russian crises. However, the 1999/2000 spike cannot be attributed to international events. The Polish impact coefficient decreases from this time, as does the difference between the Polish market and the benchmark markets estimates. Only in the most recent months does the WSE move back towards its relative higher level of responsiveness in relative and absolute terms.

To close the discussion of interdependence, Fig. 12E shows the comparison of the variance ratios (obtained for the regression specification using the UK market index returns as the independent variable). The fitness of the model favours the WSE at the beginning of the investigated period. However, the difference between the Polish market and the benchmark markets declines as time progresses. The most

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[21] The autocorrelation paths obtained for the other developed markets were virtually identical so for the sake of space only the UK results are presented.

current figures show the variance ratios are relatively similar for the two groups. This finding goes in line with the earlier discussion of the impact coefficient.

5. Conclusions

In this paper fundamental properties of the Warsaw Stock Exchange and the other exchanges operating in the post-communist countries that joined the EU in May 2004 are analysed in order to assess the impact of the pension funds' equity investments on the development of the Polish exchange. If the emergence of the pension funds has a positive impact on the development of the WSE the presented measures (size, liquidity, volatility, concentration, efficiency and integration) should improve over time on the Polish market itself and in comparison with the other markets.

This is not the case. Although some immediate benefits relative to the benchmark markets can be observed, these are very short-term and are concentrated in the period 1999-2000, i.e., during the first years of the pension funds operation when their portfolios were set up. After this period, for most measures, the relative performance of the Polish market returned to pre-1999 levels or worse. This suggests that worries expressed by several researchers (e.g., Singh, 1996; Frenkel and Menkhoff, 2004) about the negative impact of the appearance of big institutional investors on underdeveloped markets may be correct. That is, enforced home bias on emerging markets may be detrimental to the long-run development of the market. This has implications for the development of stock markets and financial structures in developing countries, and their role in development, as well as the issue of the design of pension reform.

References:

Bader, L. and J., Gold, 2003, Reinventing pension actuarial science, The Pension Forum, Society of Actuaries, January.

Bekaert G and Harvey CL. Research in Emerging Markets Finance: Looking to the Future. Emerging Markets Review 2002; 3; 429-448.

Bekaert G, Harvey CL and Ng A. Market integration and contagion. Journal of Business 2005; 78(1); 39-69.

Bodie, Z., 1995, On the risk of stocks in the long-run, Financial Analysts Journal, May/June, 18-22.

Catalan, M, G. Impavido and A.R. Musalem, 2000, Contractual savings or stock markets development: which leads? World Bank Policy Research Working Paper 2421.

Chan-Lau, J.A., 2004, Pension funds and emerging markets, IMF Working Paper, 04/181.

Davis, E.P., 1995, Pension funds: retirement income security, and capital markets- An international perspective, Oxford University Press.

Davis, E.P., 2000, Implications of the growth of institutional investors for the financial sectors, The Pension Institute, Birbeck College Discussion Paper PI-0001.

Davis, E.P., and B. Stein, 2001, Institutional investors, Cambridge, Massachusetts: MIT Press.

Demmogrüc-Kunt, A. and R. Levine, 1995, Stock market development and financial intermediaries: Stylised facts, World Bank WP 1462.

Exley, C.J., S. Mehta, and A.D. Smith, 1997, The financial theory of defined benefit pension schemes, Institute & Faculty of Actuaries, 28 April.

Frenkel, M., and L. Menkhoff, 2004, Are foreign institutional investors good for emerging markets?, The World Economy 27(8), 1275-1293.

Glaeser, E.J., S. Johnson, and A. Shleifer, 2001, **Coase versus Coasians**, Quarterly Journal of Economics, 116(3), 853-899.

Grout, P.A., and A. Zalewska, 2006, The impact of regulation on market risk, Journal of Financial Economics, 80(1), 149-184.

Harichandra, K. and S.M. Thangavelu, 2004, Institutional investors, financial sector development and economic growth in OECD countries, Department of Economics, National University of Singapore, WP 0405.

Impavido, G., A.R. Musalem and T. Tressel, 2003, The impact of contractual savings institutions on securities markets, World Bank Policy Research Working Paper 2948.

Impravido, G., A.R. Musalem and D. Vittas, 2003, Promoting pension funds in countries with small financial systems, World Bank Policy Research Working Paper

Kang, J-K., and R.M. Stulz, 1997, Why is there a home bias? An analysis off foreign portfolio equity ownership in Japan, Journal of Financial Economics, 46, 2-28.

Lewis, K.K., 1999, Trying to explain home bias in equities and consumption, Journal of Economic Literature, 37, 571-608.

Lucas, R., 1988, On the mechanics of economic development, Journal of Monetary Economics, 22, 3-42.

Mateus, T., 2004, The risk and predictability of equity returns of the EU accession countries, Emerging Market Review, 5, 241-266.

Pajuste, G., Kepitis A., and P. Hogfeldt, 2000, Risk factors and predictability of stock returns in Central and Eastern Europe, Emerging Markets Quarterly,

Roldos, J.E., 2004, Pension Reform, investment restriction, and capital markets, IMF Policy Discussion Paper 2004/4.

Roemer, P., 1989, Capital accumulation and the theory of long-run growth, in R. Barro (ed.), Modern Business Cycle Theory, Mass., Harvard University Press.

Schroder Salomon Smith Barney, *Poland Pension funds strategy, wait and see in February*, Emerging Markets, March 6th 2003.

Singh, A., 1996, Pension reform, the stock market, capital formation and economic growth: a critical commentary on the World Bank's proposals, CEPA WP 2.

Schotman, P.C., and A. Zalewska, 2005, Non-synchronous trading and testing for market integration in Central European emerging markets, CEPR DP 5352, forthcoming in the Journal of Empirical Finance.

Szumlicz T., 200,) Reform of pension insurance, Diagnoza spoleczna, Warsaw, Country report – Poland, no. 149.

Vittas, D., 2000, Pension reform and capital market development: "Feasibility" and "impact" preconditions, World Bank Policy Research Working Paper 2414.

Voronkova, S. and M.T. Bohl, 2003, Institutional traders' behaviour in an emerging stock market: empirical evidence on Polish pension fund investors, The Pension Institute, Birbeck College Discussion Paper PI-0310.

Warnock, F.E., 2002, Home bias and high turnover reconsidered, Journal of International Money and Finance, 21, 795-805.

Zalewska, A., 2006, Home Bias and Stock Market Development, forthcoming in Mickiewicz (ed.) Corporate Governance and Finance in Poland and Russia, Palgrave Macmillan.

Table 1. Selected Statistics of OFEs equity investments

	1999	2000	2001	2002	2003	2004
No of companies included in the OEFs portfolios	97	117	120	106	103	143
No of companies included in the OEFs portfolios as % of all listed equities	43.9	52.0	52.2	49.1	50.7	62.2
No of companies selected by more than half of the operating OFEs	22	23	23	25	35	43

Table 2. Selected statistics for the 20 biggest and 20 smallest companies included in the pension funds portfolios as of December 31, 2004.

Company	MV $bn	# OFE	Free float	Sector	Company	MV $bn	# OFE	Free float	Sector
20 biggest companies invested in					20 smallest companies invested in				
Bank PKO	8.96	14	21.2	Banking	Talex	0.02	4	42.4	IT
TP SA	8.87	15	20.5	Telecom	Hydrobudowa	0.02	1	12.2	Construction
PEKAO	7.35	14	17.0	Banking	Swissmed	0.01	2	45.1	Medical equip
PKN Orlen	5.17	15	27.7	Chemicals	FAM	0.01	3	13.7	Medical equip
BPH	4.69	13	21.7	Banking	Wilbo	0.01	3	20.0	IT
Bank Handlowy	2.68	5	9.9	Banking	Instal Krakow	0.01	1	14.6	Construction
BZWBK	2.26	14	19.8	Banking	Artman	0.01	3	31.1	Retailer
KGHM	2.00	15	19.5	Metallurgy	Projrzem	0.01	3	12.8	Construction
Zywiec	1.64	3	75.3	Food	LZPS	0.01	1	25.7	Light industry
ING-BSK	1.62	11	72.7	Banking	Mostostal Plock	0.01	2	7.2	Construction
BRE	1.05	8	8.4	Banking	Plast-Box	0.01	6	51.7	Chemicals
Agora	1.03	13	10.2	Medical equip	Kruk	0.01	3	25.3	Retailer
Swiecie	0.93	13	48.8	Wood	Novita	0.01	3	45.7	Light industry
Millenium	0.91	4	7.7	Banking	Hygienika	0.01	2	24.2	Light industry
TVN	0.83	5	3.4	Medical equip	Swarzedz	0.01	2	15.5	Wood
Kredyt Bank	0.82	10	38.0	Banking	Ponar FEH	0.01	1	9.45	Electronics
Boryszew	0.77	8	45.0	Chemicals	Suwary	0.01	1	12.5	Chemicals
GTC	0.67	12	63.8	Construction	Trans-Tychy	0.01	2	13.2	Building mater
Prokom	0.65	13	23.9	IT	Mostostal Zabrze	0.01	1	7.7	Construction
Netia	0.52	13	21.1	Telecom	Muza	0.00	1	25.2	Medical equip

Source: WSE and CA~IB, 2005
MV – market value; # OFE – number of the OFEs investing in the company shares; Free float – percentage of free float acquired by the OFEs
Sector – sector specification of the company

Figure 1. Number of investment accounts, end of year figures for the 1995-2004 period.
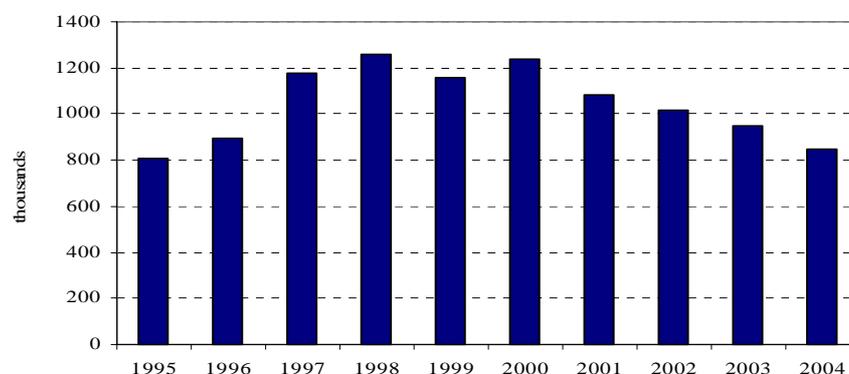
Figure 2. Comparison of monthly returns on the OFEs' equity investments and returns on the WIG index, %.


Return on equity investment —— Return on WIG
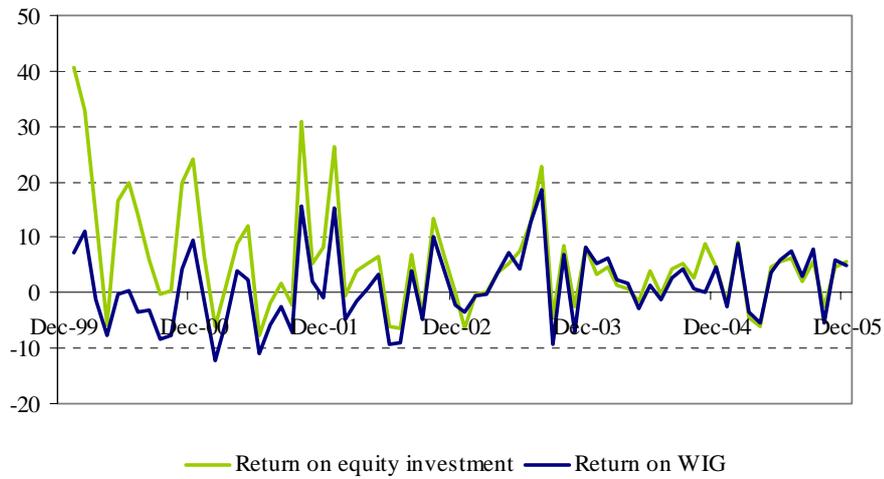
Figure 3. Performance of the WIG index in nominal and real terms; mid-month observations in the period June 1996-December 2004; (June 1996 = 100).


Nominal value —— CPI adjusted
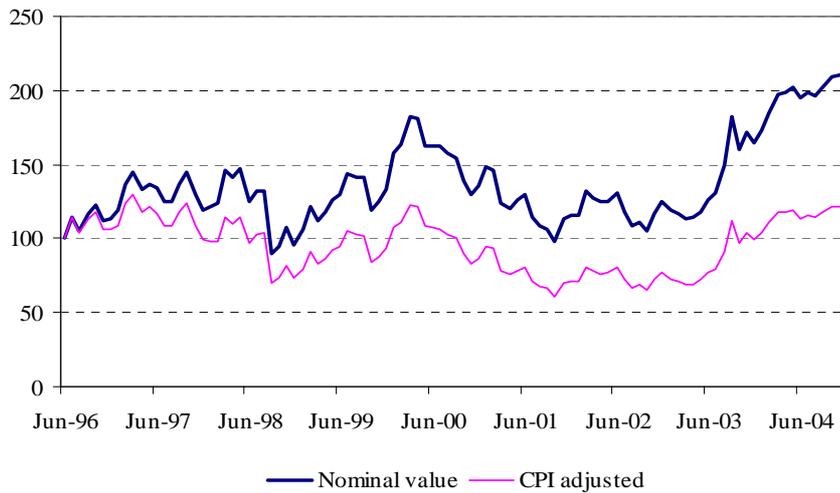
Figure 4. Difference between the WIG index and the EU-CEE average index, %.

Nominal values —— CPI adjusted ······ CARs
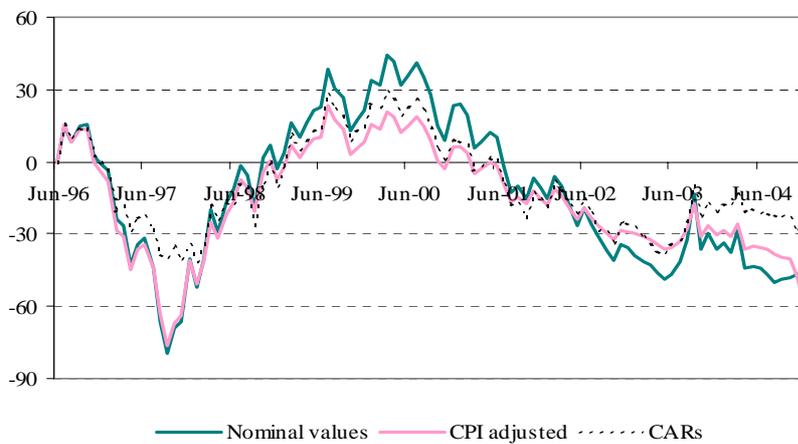
Figure 5. Comparison of the number of listed companies.
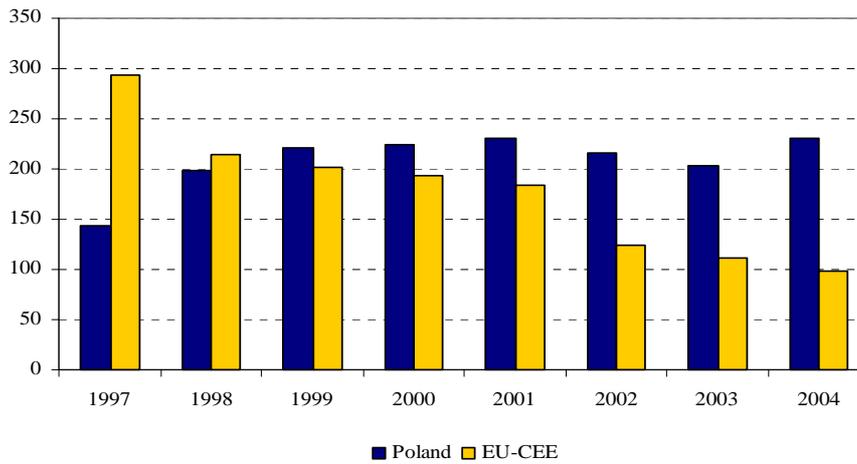
Figure 6. Comparison of the stock market capitalisation/GDP ratios, %. "Difference" figures refer to the difference between the yearly statistics of the WSE and the average of yearly statistics for the seven EU-CEE markets.
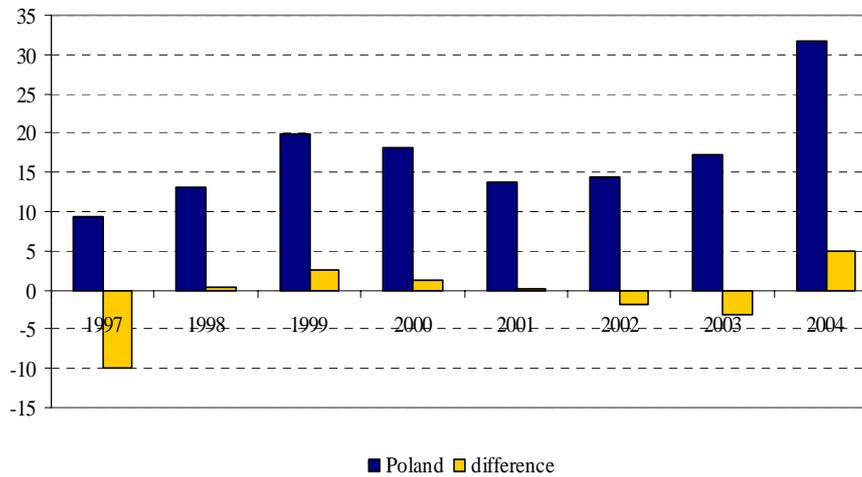
Figure 7. Comparison of total value traded/GDP ratios, %.
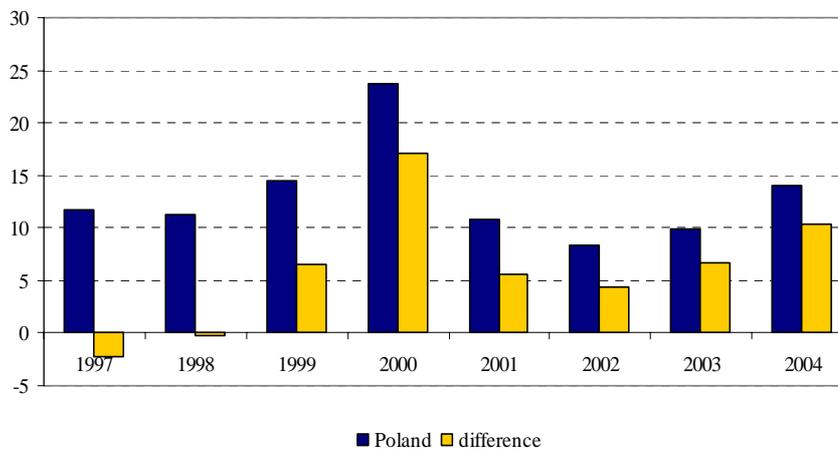
Figure 8. Comparison of the total value traded/market capitalisation ratios, %.
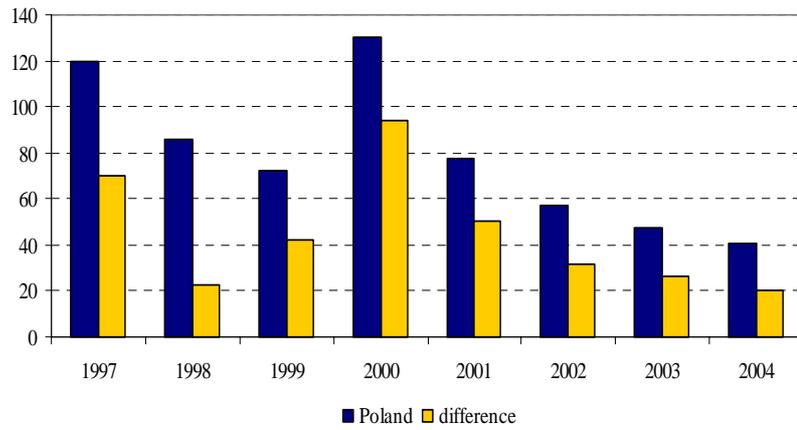
Figure 9. Comparison of the volatility (standard deviation) of daily returns in the period 1997-2004, %.
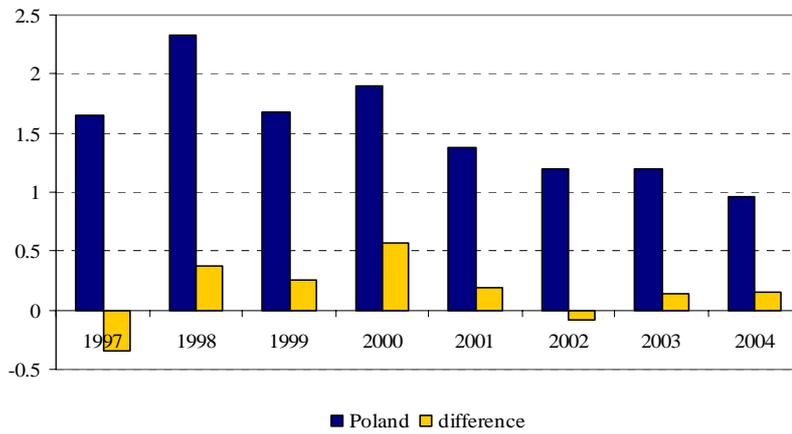
Figure 10. Comparison of the concentration ratios in the period 1997-2003, %.
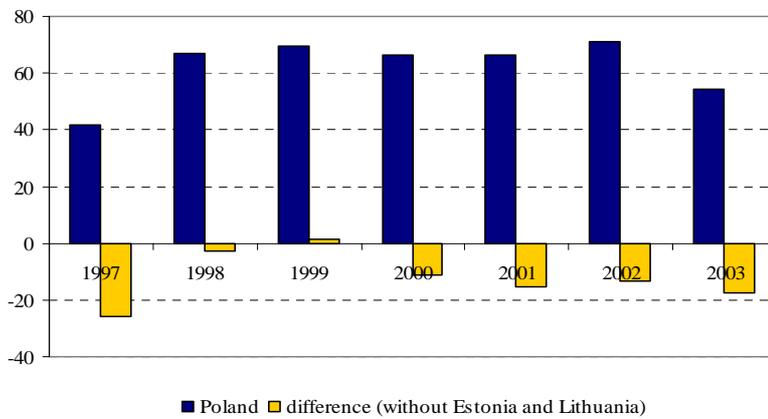
Figure 11. Comparison of the autocorrelation coefficient estimated for the WSE and the difference between the autocorrelation coefficients estimates for the WSE and the average of the autocorrelation coefficients estimated for the EU-CEE markets using daily returns in the period 1997-2004.
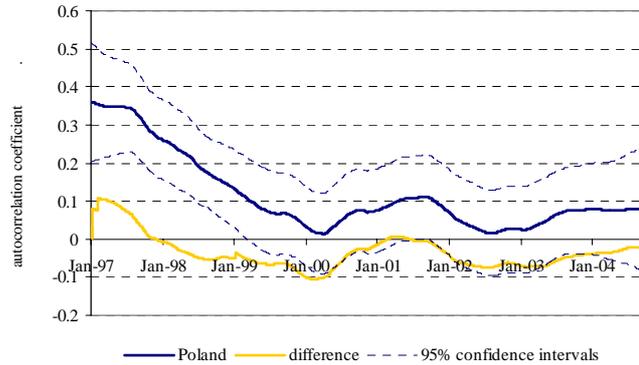
Figure 12. Panels A-D present a comparison of the impact coefficients estimated for the WSE and the difference between the WSE impact coefficient and the average of the impact coefficients estimated for the EU-CEE markets in the 1997-2004 period. The impact coefficients, β_t, are estimated from the model specification: $r_{E,t} = \alpha_t + \beta_t r_{D,\hat{t}} + \gamma_t r_{E,t-1} + e_t$, where r_E denotes daily returns on WSE or EU-CEE markets, r_D denotes daily returns on a developed market. Error term, e_t, follows the GARCH(1,1) process. The developed markets used are the U.K. (Panel A), France (Panel B), Germany (Panel C), and the U.S. (Panel D). Panel E shows a comparison of the differences in the impact coefficients estimated for Poland and EU-CEE markets and presented in Panels A-D. Panel F shows a comparison of the variance ratios $VR_t = \dfrac{\beta_t^2 \varpi_t^2 + \sum_{j=1}^{t-1} \prod_{i=0}^{j-1} (\gamma_{t-i} \beta_{t-j} \omega_{t-j})^2}{\psi_t^2}$ calculated for the UK model specification.

Panel A
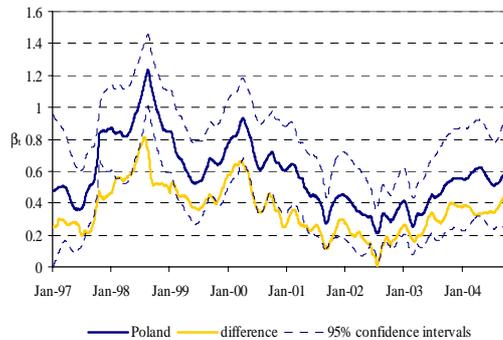
Panel B

Panel C

Panel D

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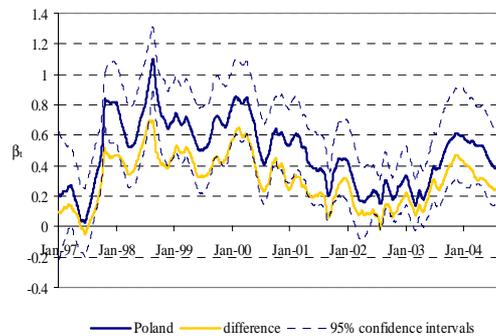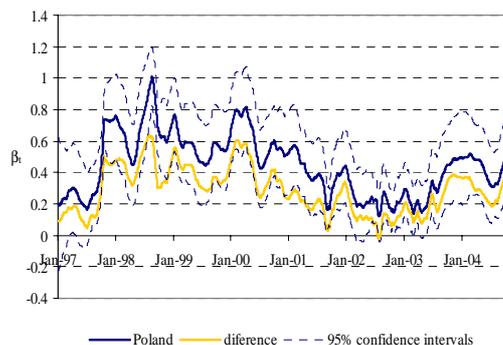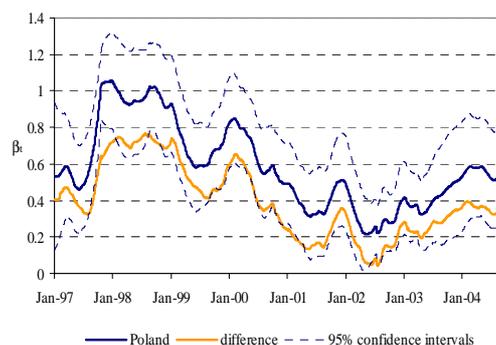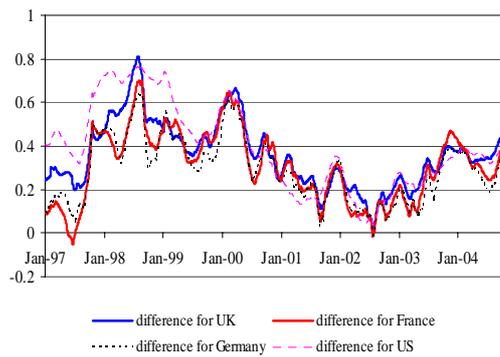
Panel E

Panel F
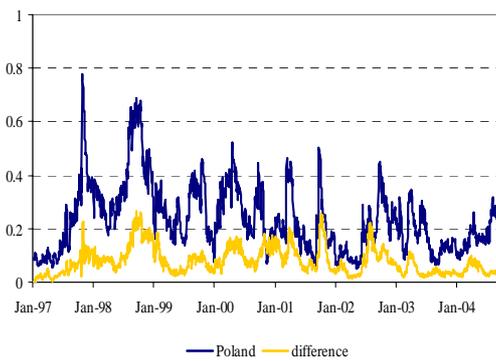
Appendix 1

Table A1.

Stock markets and indexes selected for the empirical analysis

Country	Stock Market	Market index
Poland	Warsaw Stock Exchange	WIG
Benchmark EU-CEE markets		
Czech Republic	Prague Stock Exchange	PX50
Estonia	Riga Stock Exchange	TALSE
Hungary	Budapest Stock Exchange	BUX
Latvia	Riga Stock Exchange	RIGI
Lithuania	National Stock Exchange of Lithuania	LATIN10
Slovak Republic	Bratislava Stock Exchange	SAX16
Slovenia	Ljubljana Stock Exchange	SBI
Benchmark developed markets		
France	Paris Stock Exchange	CAC40
Germany	Frankfurt Stock Exchange	DAX30
UK	London Stock Exchange	FTSE100
US	New York Stock Exchange	S&P500