

The Future of Stock Exchanges in European Union Accession Countries is published by the Corporation of London. The contributors to this report are Professor Stijn Claessens of the University of Amsterdam, Ruben Lee of the Oxford Finance Group and Professor Josef Zechner of the University of Vienna.

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TABLE OF CONTENTS

Executive Summary	4
1 Introduction	6
2 Stock market development in EUAC	7
3 The degree and effects of internationalization	14
4 Outlook for stock exchanges in EUAC	24
5 Conclusions	31
6 References	33
7 Appendix: Largest Companies	34

EXECUTIVE SUMMARY

Stock exchanges in EU accession countries (EUACs)¹ are still relatively new, with low liquidity due to the short history of their listed companies and the undeveloped state of the domestic institutional investor base. At the same time, EUAC exchanges, maybe more than other markets, are affected by internationalization trends: they are geographically close to, and share the same time zone as, large financial centres; their firms are integrating rapidly with the EU through trade, investment and other cross-border capital flows; and their markets are increasingly converging to the EU model in terms of standards (such as those relating to corporate governance, accounting, disclosure, and listing). There has also been a consolidation of trading systems in Europe. Internationalization could thus make it more difficult for the EUAC exchanges to survive, especially the small ones.

Stock exchanges and policy-makers in EUACs are aware of these issues and are responding in a number of ways, including strengthening their own listing standards, improving their trading systems, and enhancing corporate governance standards. They are also establishing different types of alliances with stock exchanges in Europe, as in the case of the Warsaw Stock Exchange (WSE) with Euronext, and some of the Baltic exchanges with the HEX Group (the holding company for the Helsinki Exchange). More general EUAC reforms, including the development of a domestic retail base and enhancement of local institutional investors, are further helping to develop local activity.

These efforts will help improve the functioning of these markets, but whether they are sufficient to allow for active local stock exchanges is unclear. If the current strategies are not successful, there could be adverse consequences for the financial sector and for economic growth. Countries may therefore have to rethink their strategies, especially those with small markets. Some may be able to operate a stock exchange on a small scale. Others may choose to have foreign exchanges provide services locally, whether in collaboration with local institutions or on their own. This may require the removal of

¹ The countries covered in this report include Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia. The report does not cover the EU accession countries Cyprus and Malta.

impediments to foreign participation. Other options include linking local trading systems more tightly, or even merging them, with other global markets. These options are not necessarily exclusive.

Even then, the future of many stock exchanges in EUACs remains unclear. Without substantive changes in strategy some EUAC stock exchanges are likely to go through a period of decline as large corporations continue to seek foreign listing, as trading is diverted abroad, and as the local market activity of the few remaining smaller corporations is reduced. In some countries, it may be difficult to support an independent exchange. This need not be a direct cost for those firms that can list abroad, or for investors as long as they have access to trading services on a cross-border basis. Countries will need to concentrate on creating the conditions that allow corporations to issue and trade shares efficiently, such as improving shareholder rights and the quality of local legal systems. They will also need to enhance corporate governance, accounting, and listing and other rules, up to the standards of the international financial centres. In some countries, enforcement of securities market regulation will need to be strengthened.

Although stock exchanges in EUACs may not have a comparative advantage in the provision of capital raising, listing and trading services for large firms, the majority of small and medium-sized firms will not be able to go directly overseas. Since these firms are important for economic growth and need to raise capital, a decline in local market activity can be costly for countries. Policy responses can vary. One model is a more proactive policy specifically aimed at bringing firms for the first time to a public market. This type of special market has been tried many times, however, not least in the EU, and it has been difficult to sustain on a long-term basis (as the experiences of the Nouveau Marché and the Neuer Markt illustrate). Other options, such as establishing a regional exchange (like NEWEX) have also achieved limited success. Regardless of the option chosen, the financing of new and expanding firms requires the development of venture capital firms, commercial banks, non-bank financial institutions, and institutional investors. In order for these forms of financial intermediation to work, major innovations may be required in the legal and institutional set-up necessary to support an active first-stage financing industry.

1 INTRODUCTION

The objective of this paper is to investigate the future of stock exchanges in EU accession countries (EUACs). The report analyses the determinants of stock markets in EUACs, investigating the role of macroeconomic variables, financial reform, and other country factors. It next analyses the viability of EUAC stock exchanges in light of migration, describing and analysing the patterns, determinants and impact of foreign listing by corporations in EUACs over the last decade, and studying these firms relative to those listing only locally. It also analyses the impact on local liquidity. Using this analysis, the paper investigates the future of EUAC local exchanges, reviewing existing work on the structure and evolution of stock exchange trading systems. It provides an overview of recent trends in the consolidation of exchanges worldwide and links among EU exchanges. It draws possible implications for the future of stock exchanges in EUACs and discusses possible policy options.

The paper is composed of four sections. The first contains an overview of stock market development in the EUACs. In the next section, the degree of internationalization of EUAC stock markets and relevant developments in stock exchanges are analysed. In the third section, a number of strategic options that stock exchanges in EUAC might pursue are examined. Brief conclusions are provided in the final section.

2 STOCK MARKET DEVELOPMENT IN EUAC

History of the stock exchanges in EUACs

Stock markets are not new in EUACs — the Warsaw Stock Exchange was opened in 1817, and the Prague Stock Exchange was established in 1871. Under socialism, however, all stock markets were closed. But during the transition from the planned to the market economy, stock exchanges have re-emerged or were created in all EUAC. These exchanges have mainly been used for the mandatory listing of shares of mass-privatized companies or for voluntary initial public offerings (IPOs). The first stock markets in the transition economies emerged in Hungary in 1990, followed by Poland in 1991 and the Czech and Slovak Republics in 1992. Bulgaria, Lithuania and Romania followed soon after. The basic feature of this first group of markets was the transfer among investors of ownership rights to mass-privatized companies. Initially these markets listed a large number of stocks, many of which were illiquid. But once the markets became more established, the number of stockholders fell and ownership became more concentrated. A second type of market — developed in Croatia, Estonia, Hungary, Latvia, Poland and Slovenia — started with a small number of stocks, all of which were offered in traditional ways using IPOs. Many of these stocks had fairly liquid trading, at least compared to the stocks in the mass-privatization countries.

Irrespective of origin, EUAC stock markets remain small, both in absolute and relative terms although macroeconomic developments have been favourable

Figure 1.1 summarizes the dynamics of stock market capitalization for the years 1996 to 2002 (measured in the fourth quarter of each year) for the EUACs. The market size varies, with the larger EUACs, such as Poland having larger market capitalization. In dollar terms most have grown or at least remained more or less stable. Relative to their GDP, most markets remain small, however. Inspection of Figure 1.2 shows that at the end of 2002, the ratio of stock market capitalization to GDP ranges from 3.6% for Slovakia to 37% in Estonia. These values are quite small compared to EU countries. Additionally, over the years 1999-2002, stock market capitalization relative to GDP has decreased for all countries in our sample, except for Estonia, Slovakia and Slovenia.

Figure 1.1 Equity market capitalization, in million EUR

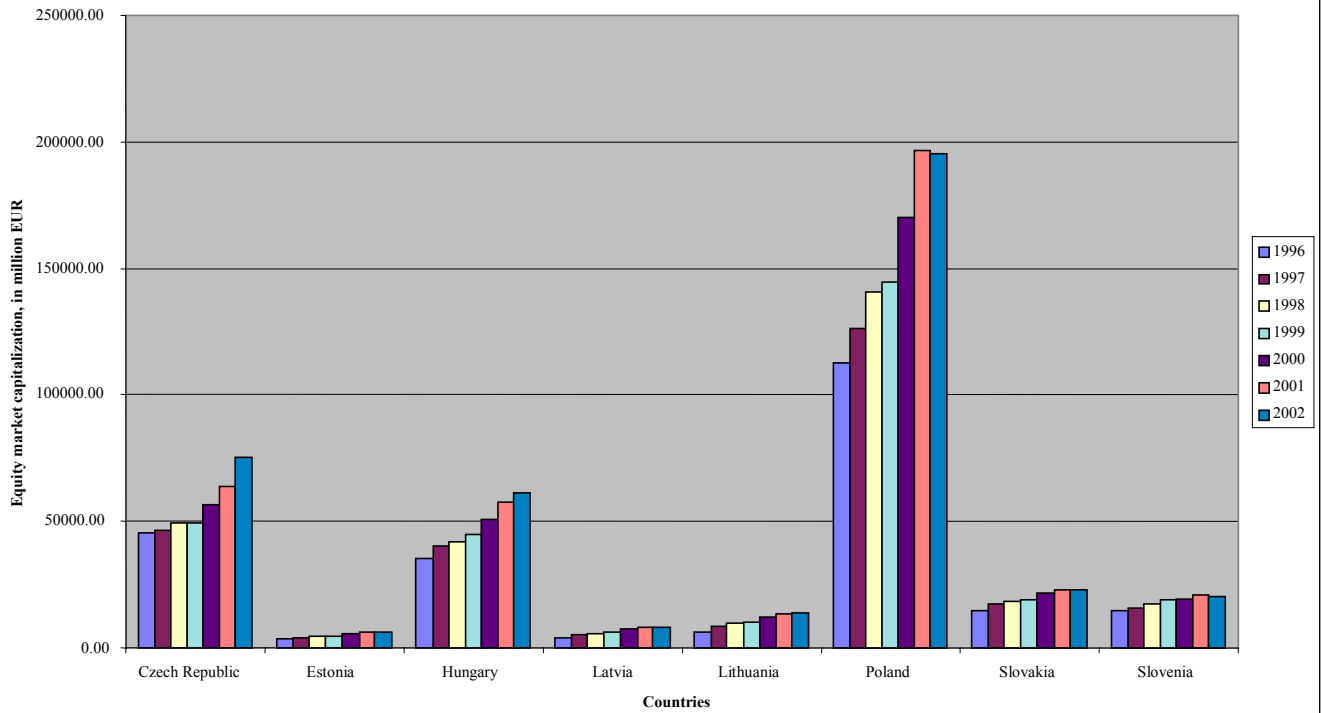
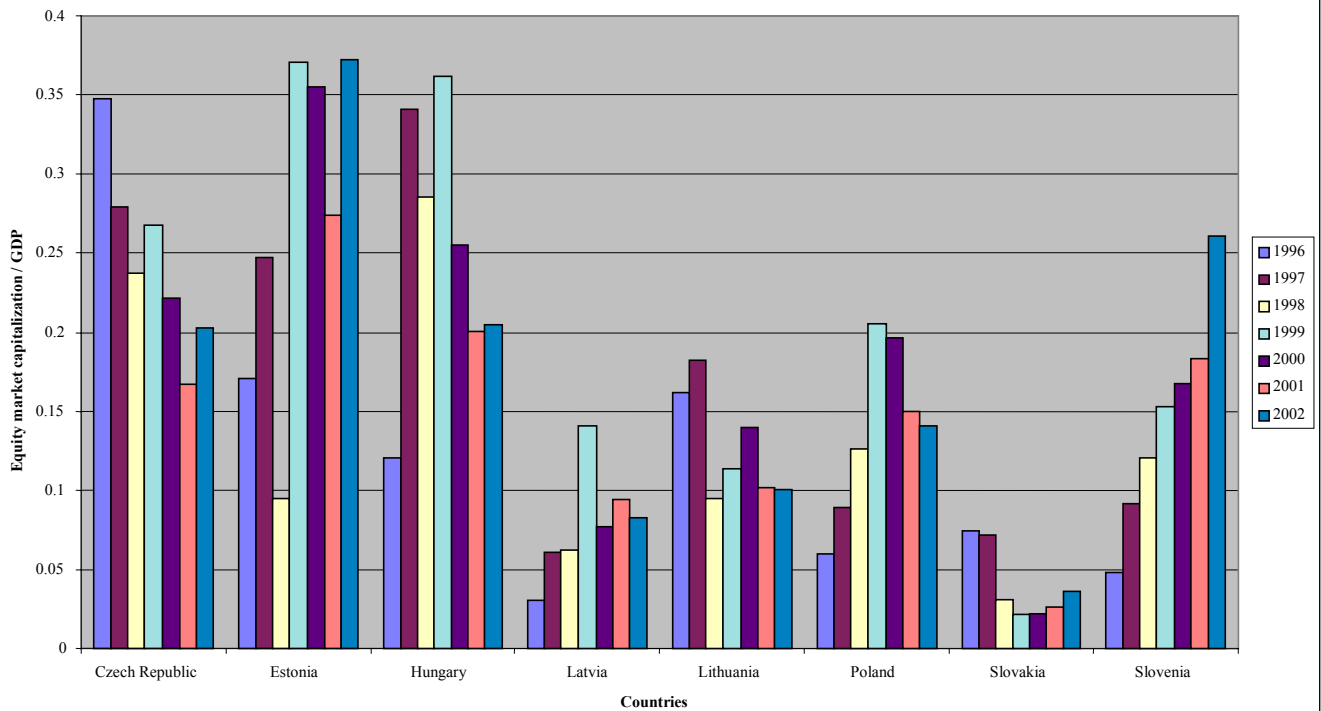


Figure 1.2 Equity market capitalization / GDP



Macroeconomic developments have generally been favourable for stock market development (Table 2). GDP *per capita* growth rates have picked up, with all EUACs experiencing significant average annual growth rates over 1999-2002. Inflation rates have dropped over the past years. The only country where inflation has stayed relatively high is Romania, but even there it has exhibited a large decrease. Capital flows, especially FDI, have increased sharply to these countries. The countries with the largest inflows of FDI relative to GDP are the Czech Republic, Slovakia, Estonia and Latvia, whereas Poland, Slovenia, and Hungary have low inflows relative to GDP. EUACs have also experienced penetration by foreign financial institutions: foreign banks now represent more than 50% of banking system assets in the Czech Republic, Poland and Hungary. More generally, financial markets in these countries are integrating rapidly with the EU and other markets.

The number of listed firms has generally declined

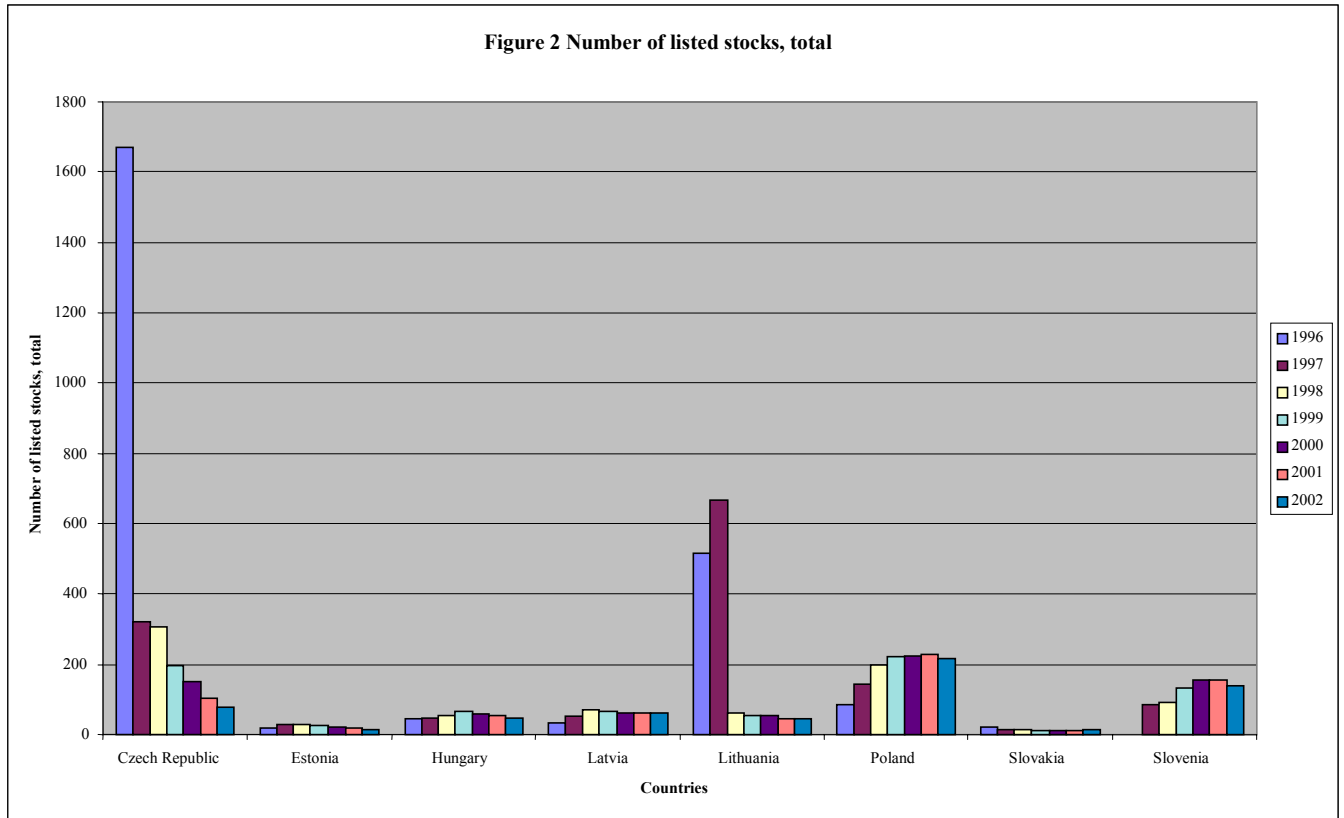
Figure 2 shows the number of stocks listed on EUAC exchanges. Most countries exhibit an inverse U-shaped picture (except Slovakia): after an initial rise, the number of firms listed has declined again. The drop in listings over the recent years is much more pronounced for the Czech Republic and Lithuania than for the other countries (especially Hungary, Poland and Slovenia). Both the Czech Republic and Lithuania used mandatory listings following mass-privatization whereas Slovenia started its stock exchange based on voluntary IPOs and Poland required mandatory listing of minority packages during privatization. For the Czech Republic and Lithuania, many of the firms that were initially privatized were probably inappropriate for the stock market, because they were too small, had too little float, or were simply ‘low quality’ companies. Some of the better companies were bought up by larger foreign firms with listings on their own domestic markets. For the other countries, the number of firms listed has remained almost constant over the last few years. Figure 3 shows that turnover has decreased significantly, even for countries where the number of firms listed has stayed relatively constant. The exception is Slovenia, where turnover relative to GDP has increased slightly.

The distribution of the type of firms listed today is still very skewed, especially in terms of size as measured by assets or sales revenues. Table 1 shows that only 10% of firms in the Czech Republic, Poland and the Slovak Republic have a total asset size in excess of \$1.5 billion and sales revenues in excess of \$1 billion. More than 50% of firms in Hungary,

Poland and the Slovak Republic have annual sales revenues of less than \$100 million. In other words, most firms listed on the EUAC stock exchanges are small by the standards of stock exchanges in most developed countries.

Better regulation and supervision has helped stock market development

The limited number of countries and the short time period for which data are available does not allow for statistical analyses of the relationship of EUACs' stock market performance to macroeconomic developments or country characteristics. Nonetheless, it is instructive to point out some simple relationships. One relevant country characteristic is the degree and quality of domestic regulation, as measured by the EBRD index for financial regulation and effectiveness. The four countries with the highest regulation scores — Hungary, Poland, Slovenia, and Estonia — saw an increase of 52% in the number of firms listed between 1996 and 2002. The four countries with the lowest scores - Latvia, the Czech Republic, Lithuania, and Slovakia - experienced a decrease in the number of firms listed, by 31%. The four countries with the highest regulation scores increased their market capitalization per GDP by 191%, whereas the four countries with the lowest scores increased their market capitalization per GDP by only 11%. This suggests that higher levels of effectiveness of financial regulation have helped the development of local stock markets. Such a conclusion remains tentative, however, as there are many other factors determining the number of companies listed on a market and their capitalization.



**Table 1: Distribution of size of firms listed on four major EUAC exchanges
(Averages for respective percentiles; Data in millions of US dollars)**

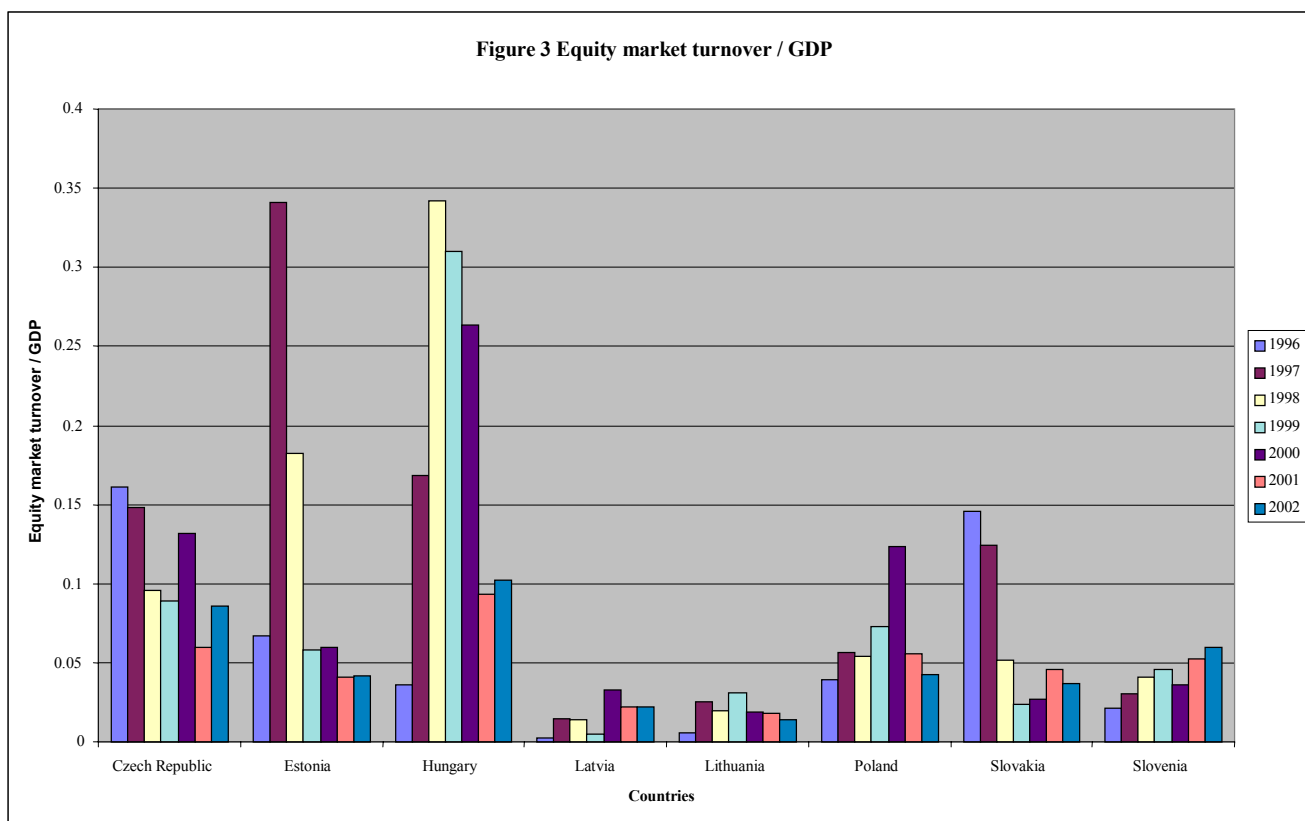
Country	p1	p5	p10	p25	p50	p75	p90	p95	p99
TOTAL ASSETS									
CZECH REPUBLIC	34	46	55	98	199	402	1,532	5,288	13,652
HUNGARY	4	13	19	33	74	185	544	2,552	7,881
POLAND	10	15	20	34	93	268	1,678	3,142	5,045
SLOVAK REPUBLIC	15	28	31	47	113	302	1,545	3,331	4,455
SALES REVENUES									
CZECH REPUBLIC	19	38	46	68	147	291	1,003	1,491	1,905
HUNGARY	2	5	15	39	75	199	434	1,261	3,078
POLAND	12	19	22	41	91	239	518	652	1,674
SLOVAK REPUBLIC	9	9	20	47	82	192	986	1,213	1,342

Table 2: Macroeconomic Data

GDP Per Capita (EUR)								
	1996	1997	1998	1999	2000	2001	2002	2003
Poland	2911	3265	3640	3740	4412	5091	5058	5212
Slovenia	7471	8082	8851	9450	9850	10528	10313	11512
Czech Republic	4424	4535	4833	4838	5494	6211	7288	7898
Slovakia	2754	3186	3381	3515	3941	4231	4229	4804
Hungary	3475	3974	4166	4499	5035	5791	6110	6883
Bulgaria	940	1086	1331	1421	1591	1874	1931	2215
Romania	1238	1363	1649	1421	1771	1979	1945	2003
Estonia	2338	2803	3217	3334	3973	4467	4605	5383
Latvia	1618	2005	2213	2560	3251	3529	3564	3895
Lithuania	1676	2280	2593	2697	3302	3622	3748	4273

Inflation (percent per annum)								
	1996	1997	1998	1999	2000	2001	2002	2003
Poland	27.8	19.9	14.9	11.8	7.3	10.1	5.5	2.4
Slovenia	13.5	9.9	8.4	8	6.1	8.9	8.4	7.3
Czech Republic	9.1	8.8	8.5	10.7	2.1	3.9	4.7	2.1
Slovakia	9.9	5.8	6.1	6.7	10.6	12.2	7.3	3.3
Hungary	28.2	23.6	18.3	14.3	10	9.8	9.2	5.3
Bulgaria	62.1	123	1082.2	22.3	2.6	10.3	7.4	6
Romania	32.3	38.8	154.8	59.1	45.8	46.2	34.5	23.5
Estonia	29	23.1	11.2	8.2	3.3	4	5.8	4
Latvia	25	17.8	8.6	4.7	2.4	2.6	2.5	2.6
Lithuania	39.5	24.7	8.9	5.1	0.8	1	1.3	1.5

FDI/GDP (percent)								
	1996	1997	1998	1999	2000	2001	2002	2003
Poland	2.9	2.6	3.8	3.8	5.3	2.8	1.7	2.1
Slovenia	1	1.5	0.7	0.3	0.7	1.8	2.4	1.8
Czech Republic	2.2	2.4	6.4	8.2	7.2	8.5	10	6.5
Slovakia	1.1	0.4	1.2	3.5	9.8	7.3	16.4	5.5
Hungary	4.8	5.5	3.1	5.4	0.4	1.4	1.2	1.4
Bulgaria	1.3	5.4	4.5	3.9	6.3	3	3.9	4.1
Romania	0.7	3.9	5.1	3	2.8	2.9	2.5	3
Estonia	3.3	1.8	9.2	7.6	4.8	6.4	4.8	4.8
Latvia	5	5.2	4.7	5.3	5.5	5.9	6.1	5.9
Lithuania	2.1	3	8.2	4.8	3.4	4.4	4.9	3.5



But some forms of FDI seem to have retarded stock market development

Another relevant country characteristic is FDI inflows. Grouping countries by their average FDI/GDP over the years 1996 to 2002, we find that countries with the lowest FDI/GDP ratios over this period (Slovenia, Hungary, Poland, and Lithuania), and those with the highest ratios (the Czech Republic, Slovakia, Estonia, and Latvia), had strikingly different developments in their stock markets. Whereas the growth rate in the number of firms listed between 1996 and 2002 for the lowest FDI/GDP countries was 35%, the average of the growth rates for the highest FDI/GDP countries was minus 17%. Market capitalization for the first four countries grew by 152%, whereas for the latter four it increased by just 50%. This may be because FDI acts as a substitute for the development of local stock markets. In countries with high FDI inflows, firms have more opportunities to raise capital through foreign parent companies. At the same time, high levels of FDI are associated with foreign firms buying stakes in domestic firms, which may result in de-listings of the acquired firm from the local exchange. Again, these correlations are suggestive and do not present firm evidence — there are many other factors determining

both FDI as well as listings. Most other macroeconomic data, such as inflation rates, do not seem to correlate strongly with the development of the EUACs' stock markets.

3 THE DEGREE AND EFFECTS OF INTERNATIONALIZATION

Increased cross listing by firms from emerging markets on developed countries' financial markets.

Many emerging markets have seen an increasing number of firms cross-listing (here defined to include dual-listing, using depository receipts, or listing only on an international exchange) in international financial centres over the past decade. For all emerging markets combined, the ratio of market capitalization listed abroad to total market capitalization jumped from only a few percent in 1989 to about 50% currently, with a peak of over 62% in 1999 (Figure 4). There are similar trends in the degree of capital-raising and trading activity on international exchanges. The amount of capital raised abroad - especially for middle-income countries - rivals that raised domestically as large firms, and particularly those being privatized, generally include large tranches geared to international markets.

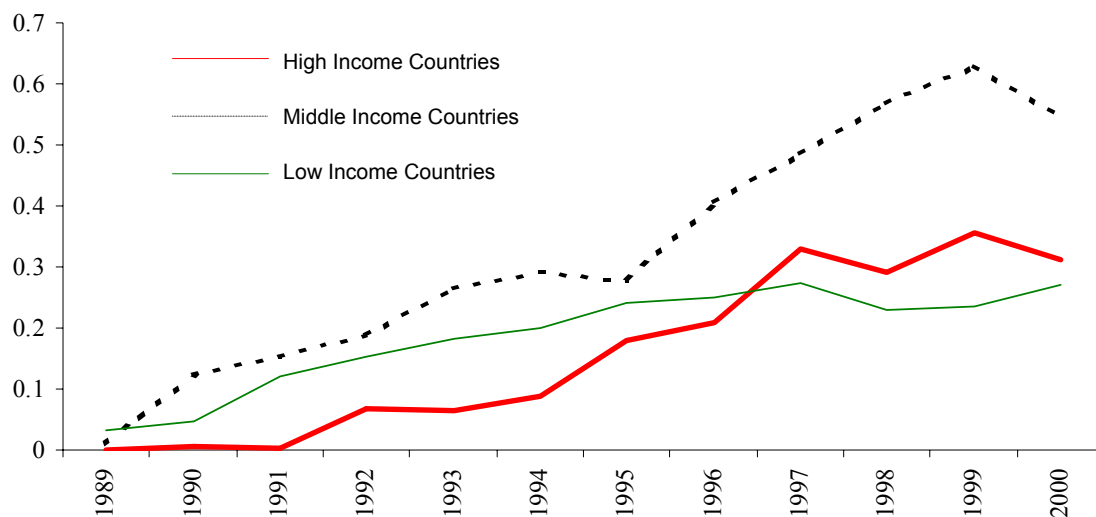
These patterns are also present in EUACS.

These issues are relevant for many developed countries, including some within Western Europe, but even more so for a number of emerging markets. Although the degree of listing of firms in EUACs on international stock exchanges varies considerably among individual countries, it is on average more extensive than in Latin America and East Asia. In some cases more than two-thirds of stock market capitalization is listed abroad as well as domestically. Relative to some other regions, internationalization in the EUACs also occurred earlier. Whereas for most emerging markets, cross-listing really accelerated in the mid-1990s, for EUACs there was considerable cross-listing already in the early 1990s as local markets were being established, followed by some further cross-listing up until 1995/96. This reflects, in part, the transition process of these economies to market economies where many large firms already existed, but which, following the onset of transition, were being privatized and listed both on local and foreign markets quickly. The

dual listings added credibility to the privatization process, and in that way had positive feedback on the incipient local markets at that time.

Figure 4

Market Capitalization of International Firms / Market Capitalization of All Firms



Note: Figure 4 shows the evolution over time of the ratio of market capitalization of firms with international programs over the total market capitalization in domestic stock markets. The series are grouped by income level, following the classification of the World Development Indicators, World Bank.

Table 3
Degree of Migration (Firm Level Data)

	Market Capitalization of International Firms / Total Market Capitalization (Country Aggregates)		Number of Cross-Listed Firms	Percentage of Cross-Listed Firms	Number of Listed Firms (the number of firms for which listing and firm-specific financial information was available)
	Value Traded Abroad / Value Traded Domestically (Firm Level)				
Czech Republic	98.9%	11.8%	40	36.0%	111
Estonia	95.3%	84.7%	8	44.4%	18
Hungary	99.8%	14.6%	52	74.3%	70
Latvia	0.3%	0.6%	2	12.5%	16
Lithuania	42.4%	337.3%	5	11.4%	44
Poland	81.3%	62.5%	30	28.6%	105
Slovak Republic	76.2%	NA	6	23.1%	26
Slovenia	7.0%	5.9%	2	10.0%	20
Average/Total	62.6%	73.9%	145	35.4%	410

The front-runners in reform and accession have seen more internationalization

Altogether, more than 140 firms (just over 35% of all listings) from EUACs are cross-listed, mostly in New York and London (Table 3). The front-runner countries in terms of reform and accession — namely the Czech Republic, Estonia, Hungary, and Poland — have seen the most cross-listings. Since the cross-listed firms tend to be the large firms, an even greater share of markets has been internationalized in terms of capitalization: for these four countries, firms representing more than two-thirds of market capitalization also list abroad. Lithuania and the Slovak Republic follow with firms representing one-third of market capitalization being listed abroad. Slovenia and Latvia have less than 10% of internationalised firms, with capital restrictions in Slovenia limiting the ability of firms to tap into international markets. In terms of trading abroad, the trends are equally strong across most countries. For countries like Estonia and Poland the ratio in trading abroad of domestic trading is more than 60%.²

Internationalized firms are generally the larger and better performing firms

As in other regions, the EUAC firms migrating are typically larger than their domestic-only counterparts. The median asset size of internationalized firms is \$210 million versus \$90 million for domestic EUAC firms (Table 4). Internationalized firms grow faster and carry on more international business than domestic firms. Internationalizing firms are generally the better performing segment of the local market. This reflects both demand and supply factors: better performing firms are likely to have greater growth opportunities, which makes seeking foreign financing more attractive. International investors may also view these types of firms more favourably. This selection process does imply, however, that firms listed only on the local markets will be smaller and perform less well.

² For Lithuania trading abroad exceeds domestic trading by a factor of three but this is based on very few stocks.

Table 4: Differences between International and Domestic Companies

The table reports the medians of characteristics of domestic firms and international firms, covering the whole sample.

Firm-Level Variables	Median	
	Domestic Firms	International Firms
Size		
Total Assets (US\$ Billions)	0.09	0.21
Growth		
Sales Growth (percent)	1.31	4.23
Performance and Valuation		
Price-to-Book Value	1.42	1.48
Return on Assets	11.94	10.17
Financial Structure		
Liabilities to Total Assets	48.87	54.42
Others		
Foreign Sales / Total Sales	27.74	47.22

Cross-listing can affect the liquidity of internationalized firms in the local market

Foreign listing may divert trade away from the local exchange. Trading of a domestic share on a foreign exchange, however, is not simply a substitute for trading on the local market, – it can lead to greater domestic trading if the stock attracts more attention or acquires a higher reputation. Trading abroad may also lead to greater trading locally if foreign trading is unwound on the local market. Domestic traders may also be better informed about local companies than foreign investors. Foreign investors know this, keeping the trading of companies on the local market.

While studies are still ongoing, negative effects seem to dominate, at least for emerging markets, since there is some evidence of a decline in local liquidity as a result of internationalization.³ For the EUAC firms, there does not appear to have been a direct negative impact on domestic liquidity as, on average, trading as a share of market capitalization appears larger than before following listing abroad. Most of this reflects the fact that trading has been increasing in general in these markets over the period studied. A

³ Pagano *et al.* (2002) report that home market liquidity, as measured by the turnover ratio, drops significantly upon listing. They report that this effect is larger for firms listing within Europe, suggesting that being in the same time zone aggravates matters. For a cross-section of 55 countries, Levine and Schmukler (2003) also show that a decline in local market activity is typical for firms that internationalize.

lot of foreign trading also gets unwound on the local markets. The cross-listing may in addition have served as an important signal to investors, local as well as foreign, that enhanced the reputation of both the specific stocks in the local market as well as of the local market in general. As a consequence, dual-listing in these markets was not a zero-sum but a positive-sum game, as liquidity was being created locally. There is also evidence that, after an initial surge of foreign activity, trading flows back to the original market (Karolyi 2001). Trading and price discovery ends up concentrating in one place, most often the home market.

Less local activity associated with international listing need not be a cost

Even when cross listing is associated with less local activity, this does not necessarily represent a loss to the country, once the distinction between the availability of capital market services and the local production of these services is taken into account. As long as individual firms and investors have access to trading services globally, there need not be a cost for the individual firm. Competition between trading systems can also enhance overall market performance. Even when dual listing leads to a split in order flow, it need not have negative effects on the price formation processes, but in some cases it has been found that internationalization adds to market segmentation.

But there can be a cost for the remaining domestic firms and for the whole market

Even when the liquidity and price setting process of a particular internationalizing firm is not affected, internationalization of a particular firm can have effects on the local exchange as a whole. Studies show that as firms move to international markets there may be negative spillovers for the remaining firms. Using data for over 3,000 firms from 55 countries during 1989-2000, Levine and Schmukler (2003) find that internationalization reduces the liquidity of remaining domestic firms through two channels. First, a reduction in domestic liquidity of international firms has negative spillover effects on the liquidity of the remaining domestic firms. Second, there is trade diversion within the domestic market

as liquidity shifts out of domestic firms and into international firms. Others have found similar related effects.⁴

These effects are due to a number of factors. There is a diversion to larger, better performing and better managed firms, which are also more likely to seek international listing. In other words, the cause may not be internationalization, or the difference between international and local listing, but rather the differences in the quality and performance of listed firms. Second, for many countries the move out of domestic capital markets is part of a larger phenomenon of firms and households bypassing their domestic financial systems. Many countries in Africa and Latin America, for example, have long suffered from sustained capital flight and poor local financial sector development, with residents using foreign financial services.

Some of these patterns are also present in EUACs

Being a region with relatively new stock exchanges, the evidence for Eastern Europe is still limited and sometimes ambiguous. For Polish companies listed on a foreign exchange, turnover on foreign stock exchanges is often smaller than domestic turnover on the Warsaw Stock Exchange (WSE). Trading in Polish firms listed in London, for example, generally had little effect on local market turnover. This is consistent with the home market preference found for many developed countries. The modest performance of NEWEX, a special stock exchange with a Central and Eastern European focus, founded jointly by Deutsche Börse and Wiener Börse, also demonstrates how difficult it is to generate foreign trading volume in EUAC stocks (Box 1).

⁴ For 28 stock markets, including Latin America, Asia, and Eastern Europe, Moel (2000) has found that increased use of ADRs negatively affects local liquidity and the ability of the local market to foster growth. It also adversely affects investability, that is, the openness of the market to foreign investors. Moel further reports evidence that these effects are the most deleterious for Africa and Latin America, and that ADRs with higher trading volumes in the US tend to have a bigger impact (in terms of worsening the development of the local market). Karolyi (2002) focuses on the effects of migration on the quality of the local market. He reports evidence for a sample of 12 emerging markets that ADRs can represent a diversion of activity away from the local market, leading to a deterioration in the quality of the remaining local market as trading volume and liquidity diminish. This in turn can lead to fewer global investors in stocks — beyond those trading as ADRs — and increasingly lower participation by local investors and companies. He reports also some evidence that migration reduces the ability to diversify risk locally and worsens the risk profile of the remaining corporations, in part as the remaining market becomes less

But other evidence does suggest that some of the negative effects mentioned above are present as well in EUACs. Foreign listing of a few large companies can have a large impact, especially for smaller exchanges, given that most trading on such exchanges takes place in precisely these larger shares. It may also adversely affect capital flows. The market capitalization of most issuers on EUAC exchanges is small to begin with, compared with the size of most companies in which global portfolio investors invest. With further declines in liquidity, the remaining companies therefore become even more unsuitable for such investment.

Box 1: NEWEX

In order to create a more liquid and homogeneous market for CEE stocks, on November 3rd 2000, Deutsche Börse AG and Wiener Börse AG jointly founded NEWEX, a stock exchange offering a special trading platform for CEE stocks. Trade initially took place on a slightly adapted version of Deutsche Börse's trading system, XETRA, with an open order book under the supervision of a broker/market-maker. Trades were executed in euros and settlement occurred via Clearstream, the subsidiary of Deutsche Börse. All listed firms had to apply either IAS or US GAAP accounting standards, publish quarterly reports, hold conferences for analysts and accept certain disclosure requirements.

Although approximately 150 stocks were initially traded on NEWEX, trading volume was much lower than expected. Therefore, in 2001 trading in the NEWEX listings was transferred from Vienna to Frankfurt. NEWEX is now a special Deutsche Börse segment for CEE equities.

Several factors are thought to have contributed to the limited success of NEWEX.

First, even after the introduction of NEWEX, the market in CEE stocks remained fragmented. Floor trading of CEE stocks continued at several German exchanges, including Frankfurt and Berlin. Thus, NEWEX was only able to attract a fraction of the total foreign trading volume of CEE stocks. Some Austrian institutional features, such as penalty payments for late delivery, contributed to the migration of volume to the trading floors of German exchanges.

Second, domestic resistance to listings or cross-listings of CEE stocks on NEWEX may have hindered performance. Clearly NEWEX was unable to overcome the opposition by CEE stock exchanges and other CEE institutions to NEWEX listings or cross-listings. There seems to have been less concern from CEE financial institutions about perceived competition from cross-listings of their blue chip firms in London or New York.

Third, the NEWEX members did not include any of the leading investment banks. Also Scandinavian banks did not participate in the market, so the Baltic states were lost as potential constituencies for NEWEX.

Fourth, NEWEX seems to have started with a sub-optimal market microstructure. Technical access was rather complicated. Also, the permanent auction model did not fully exploit the liquidity potential for the biggest stocks. More recently, different trading models have been introduced for different NEWEX segments.

internationally integrated. These effects may be specific, however, to the emerging markets sample he analyses.

Other threats

Competition to EUAC stock exchanges could, in principle, come from alternative trading systems (ATSS), as well as through the internationalization of listed firms. To date, no significant competition by ATSS to existing exchanges in the EUACs has materialized and it is very unlikely to do so. This is for two reasons: (i) many of the EUAC authorities believe that stock exchanges are a natural monopoly and ban ATSS; and (ii) markets are too small to attract big international ATSS such as Instinet. At present, in Poland, for example, trading via ATSS and internalisation is not allowed, and trading has to be concentrated on the stock exchange. If passed, however, a new draft of the Polish Securities Law will permit such activities. In the Czech republic, the Prague Stock Exchange (PSE) has 99.6% of the domestic market, with 0.2% on ATSS, and the rest is traded OTC.

Internalization by major financial intermediaries may be a more likely threat to the EUAC stock exchanges. Although significant internalization has not yet occurred in most EUAC markets, in less developed and less supervised markets internalization and off-exchange trading is often endemic. In some less well-developed EUAC jurisdictions, exchanges are thus likely to face competition in the future from major financial intermediaries internalizing trades.

A more realistic threat is of a regulatory nature. Much current regulatory effort in EUACs is devoted to the creation and enhancement of domestic institutional investors, which may have natural domestic liabilities. Furthermore, the expected growth of a domestic retail-trading base can help enlarge domestic trading. A key threat, however, is that domestic portfolio restrictions requiring investors to place a specified minimum of their funds in local securities may be abolished. In Poland, for example, there is currently a requirement that no more than 5% of a pension fund's portfolio can be invested abroad. Such restrictions are, however, likely to be eliminated with accession to the EU. Although home market preferences will likely remain strong, even among institutional investors, in part due to exchange risk, the elimination of regulations requiring investment in local securities will reduce domestic interest in the local market.

Other opportunities for stock exchanges to enhance income are limited

Options for EUAC stock exchanges to enhance current trading and other sources of revenues exist, but are limited. Remote access may facilitate easier access to a domestic market for foreign financial intermediaries. When the EU Investment Services Directive law becomes applicable to EUACs, then all jurisdictions in the EU will be required to allow EUAC exchanges to provide remote access to their exchanges. For exchanges such as the WSE, where about 30% of the turnover comes from foreign investors, the continued facilitation and enhancement of international trades is extremely important. Remote access will not necessarily bring an increase in trading, however, since similar access by foreign traders can be obtained via local brokers, which establish internal systems for routing orders on a cross-border basis. The impact of similar development on EU exchanges was negligible, as few international firms use remote access facilities.

Diversification of revenue sources may allow an exchange to survive in difficult circumstances. An exchange may seek to own its domestic clearing and settlement infrastructure. The Riga Stock Exchange (RSE) did this when it purchased the 18.92% state-owned stake in the Latvian Central Depository from the Latvian Privatization Agency in October 2002, thus becoming the sole owner of the Depository. As noted below, the RSE has been almost entirely bought up by the HEX Group (HEX) – the Finnish stock exchange group (Box 4). The diversification of income can also involve selling financial data and other services. Higher revenues may also mean higher costs for traders, however, thereby limiting their desire to trade. This may occur, for example, if an exchange seeks to own and exploit the provision of clearing and settlement services. Other potential sources of revenue include introducing trading in new instruments such as derivatives or mutual funds.

Diminishing liquidity can affect the prosperity of local exchanges

Diminishing liquidity is nevertheless an issue for most EUAC stock exchanges. Declining liquidity has its own dynamics (a ‘death spiral’) and may accelerate fast. With low liquidity, owners of stock exchanges, brokers and authorities are less inclined to incur the costs to maintain an active and transparent market. The shareholdings in relatively small companies in EUAC are already being concentrated in fewer hands, as people or

institutions seeking to control such companies gradually buy up shares. The free float of shares in many companies is therefore decreasing. Furthermore, in the process shareholder rights are often not well protected and may be violated, further depressing liquidity of these and remaining shares. Some of the most attractive companies on local domestic markets are also being bought up by bigger foreign firms and are being de-listed.

4 OUTLOOK FOR STOCK EXCHANGES IN EUAC

The continued feasibility of stock exchanges in many emerging markets, as well as in many developed countries, is open to question. The stock exchanges in EUACs are diverse, but all of them, including the most successful, face the problem of how to survive, let alone prosper, in the future. There are three reasons, however, why it might be important to maintain some form of local stock exchange throughout the EUAC.

1. There is evidence that for many companies — except the truly global ones — the domestic market is the ‘natural’ place to be traded. For developed countries, trading volumes gravitate to the domestic market even when a stock is cross-listed. Having no ‘home listing’ may be a significant problem, especially for small and intermediate-sized firms, which tend not to be able to go abroad. Given the large number of smaller firms in the EUAC markets, some form of local stock exchange may indeed be desirable for these countries. This tendency for trading to gravitate to the local market is less overt for emerging markets, however, and seems to depend on whether the domestic market meets appropriate standards. To be able to survive, EUAC stock exchanges will need to ensure the protection of shareholders’ rights and to maintain legal systems that allow firms to issue and trade shares efficiently. There may also be a need for higher standards of corporate governance, accounting, listing and transparency, and improvements in the enforcement of securities market legislation in some EUACs.
2. There are forces that work in favour of local exchanges with some degree of autonomy. A local stock exchange can adopt the market micro-structure that best conforms to the characteristics of potential listing candidates and investors, in terms of defining market segments, designing listing requirements, fee structures, etc. Autonomous local exchanges can also be more flexible in accommodating channels through which local small and medium-sized firms can tap into public securities markets, through securitization, listing of holding companies, listing of private equity funds and so forth.

3. The technology of providing trading services has changed and relatively low-cost trading systems are now available. This is making it easier to maintain local stock exchanges.

Although this means that there may be some future for stock exchanges in EUACs, those exchanges will look quite different from those today. All of these exchanges are not only relatively small internationally, but also small domestically. The stock exchanges face a choice between several options: 1) to seek to prosper by themselves by reducing costs and increasing revenues; 2) to try to build larger virtual markets by establishing some form of cross-border linkages with other exchanges; or 3) to merge with, or be taken over by, one or more other exchanges.

1. Self-Survival Strategies. In order to prosper by itself in the current climate, an exchange needs both to reduce costs and to increase revenues. As discussed above, options to increase revenues may be limited. One key way for an exchange to reduce costs is by outsourcing major expenditures. Typically this is undertaken by negotiating the use of a foreign exchange's IT software and hardware at a lower cost than would be possible if the domestic exchange had to build and operate its own structure. The National Stock Exchange of Lithuania signed a Memorandum of Cooperation in August 2001 with the WSE, covering the exchange of information and know-how in the field of market organization and development, and sharing of technology. The outsourcing of the supply of key technology may be a precursor to, or associated with, a closer linkage or even a merger between the participating exchanges. In February 2001, the HEX Group (HEX) and the Tallinn Stock Exchange (TSE) of Estonia entered into a strategic alliance. HEX subsequently sought to acquire over 50% ownership in the TSE, and offered the TSE a trading system under a facilities management arrangement (see Box 4).

2. Linkages. There are many ways in which linkages between exchanges may work, without an outright merger or takeover. Any subset of the various functions undertaken by exchanges can be shared, including marketing, listing, order routing, information dissemination, order execution, matching, clearing, settlement, and administration

services. There are also many different contractual procedures by which shared delivery of these services can be implemented. For example, an exchange can purchase services from another exchange, both exchanges may agree to sub-contract delivery to a third party, or a joint venture may be established. No single model has yet emerged as being either dominant or unequivocally better than others.

The prime aim of linkages is to reduce costs and seek to increase liquidity. Cost savings can arise from many different sources. An exchange may establish an order-routing mechanism or joint clearing arrangement with another exchange in order to offer some of its products to members of the other exchange, without requiring them either to buy a seat on its market, or to deal through a local intermediary. This may allow traders who are not members of the first exchange cheaper access to its products than would otherwise be available. Economies of scale may be available to cooperating exchanges, if their shared costs in any joint facilities are less than the sum of their separate costs would otherwise be. If the linked exchanges are able to combine the order flows they receive for similar products, they may together be able to achieve a more liquid market than either would be able to realize separately. Sharing standards (for example on communications, messaging, and technology) can also reduce costs. While some of these potential gains exist, achieving them is not easy, however, and typically requires major managerial and sometimes financial investment.

Even if several of the EUAC exchanges were to link up with each other to create a bigger virtual exchange, or indeed merge to create a larger combined exchange, the new exchange would still be relatively small by EU standards. Should an EUAC stock exchange seek to form a linkage with a partner exchange in the EU, there are five major institutions with which it could potentially cooperate: Deutsche Börse, Euronext, HEX, the London Stock Exchange (LSE), and NOREX.

Deutsche Börse has for the most part sought to develop its strategy in isolation, and therefore has not tried to enter into alliances with the smaller EUAC stock exchanges. Similarly, the LSE has also not sought to create linkages between itself and these

exchanges, preferring instead to persuade companies listed there to list on the LSE as well. The policies of Euronext, HEX and NOREX have, however, been of importance to the EUAC stock exchanges. The linkage strategy that NOREX has adopted is discussed in Box 2; the merger strategy that Euronext has followed is discussed in Box 3; and the merger strategy that HEX has adopted is discussed in Box 4.

Box 2: Linkage strategy: NOREX.⁵

NOREX is a strategic alliance between four out of the five Scandinavian stock exchanges: the Copenhagen Stock Exchange, the Iceland Stock Exchange, Oslo Børs and Stockholmsbörsen. Together these exchanges cover 80% of the Nordic equity market, and 90% of the Nordic bond markets are accessible via NOREX. NOREX has a joint system for equity trading, and harmonizes rules and requirements between the exchanges with respect to trading and membership.

The alliance is based upon co-operation between independent stock exchanges and builds on several core principles: i) cross membership – which means that member firms are encouraged to join all the NOREX exchanges; ii) a single point of liquidity – meaning that issuing companies are encouraged to list their securities on only one NOREX exchange; iii) a common trading system — in that trading on the NOREX exchanges is carried out via the single electronic trading system SAXESS, allowing the NOREX partners to take advantage of economies of scale; and iv) a common regulatory framework: the member countries of the NOREX alliance have harmonized their trading rules and membership requirements as well as the authorization obligations of brokers. NOREX initially hoped to attract the Baltic exchanges to join the partnership.

In late spring 1999, a Memorandum of Understanding was signed between the Riga Stock Exchange, the Tallinn Stock Exchange and the National Stock Exchange of Lithuania. The aim was to encourage co-operation between the exchanges in setting up a joint Baltic market based on the principles of a single point of liquidity, cross membership, and a common trading system via NOREX. In mid-1999 the Riga Stock Exchange received an official invitation from the NOREX alliance to enter into negotiations concerning the possibility of joining the Co-operation of Nordic Exchanges. On 2/5/2000 a Letter of Intent was signed between NOREX and the three Baltic exchanges in Riga, Tallinn and Vilnius, and a Design Study Agreement was signed on 17/8/2000. Subsequent negotiations failed to yield an agreement, however, and the potential cooperation between NOREX and the Baltic Exchanges was put on hold a year later on 28/5/2001. Possible explanations for the failure were that the size of the combined Baltic markets was thought too small to be commercially interesting to some of the NOREX partners, and the cost to the Baltic exchanges of joining NOREX too high.

Difficulties with linkages. Of the many attempts at cooperation between exchanges that have been proposed, few have been implemented, and of those that have been realized, most have failed.⁶ There are many reasons why. A common critical element has been technology. In particular, it frequently takes longer, and is more expensive, to build appropriate technology for market infrastructure projects than is initially anticipated. It is frequently cheaper and more efficient to buy a technology package off the shelf, than to

⁵ This is drawn from www.norex.com.

⁶ See chapters 4-5, Lee (1999).

attempt to develop a new one for a single project. A good time to consider embarking on a cooperative project is when the useful life of a particularly important technological aspect of market infrastructure is coming to an end.

Governance is also a key determinant of success or failure. Another central factor is the influence of governance structures on the development and the success of cooperative alliances. Linkages are never neutral in terms of their effects on the various constituencies of the participating markets. The governance structures of the collaborating exchanges determine how any benefits obtained by the scheme will be distributed, and whether those constituencies that believe their interests might be harmed have the power to change or obstruct its implementation.

Joint ventures may give rise to conflict both within a particular institution participating in such a scheme, and between the institutions supposedly working together on the project. The resolution of these conflicts may be dependent not only on the contractual agreements signed between the relevant parties, but also on their relative commercial power.

Another problem is the difficulty of creating credible contractual commitments between cooperating partners. To achieve this, not only do such agreements have to be initially beneficial for the participants, they have to continue to be so even in a changing environment. If material circumstances vary, as often occurs, one or more of the participating entities may decide that the original contractual agreement is no longer appropriate. It is normally then hard for the other participating organizations to insist that the dissenting institution honour its original agreement. The costs of enforcing any such contract are typically too high to warrant any legal attempt to do so, particularly in an international environment. More importantly, however, even if a participating exchange could be forced into an action it perceived as unfavourable, the market participants who trade on the exchange cannot be compelled to use the linkage. There is thus little point in forcing an unwilling exchange to continue honouring an initial participation agreement without the active support of its customers or members.

Many other barriers exist to the successful implementation of linkages between exchanges, including: i) legal issues, especially concerning clearing and settlement; ii) aspects of how such linkages should be financed; and iii) political questions, both at a national level, and throughout the relevant financial communities.

3. *Mergers and Takeovers.* There have been only a few mergers and takeovers between exchanges. Many of the problems associated with linkages between exchanges are also present in mergers between exchanges, and there may indeed be additional problems. In a merger, the identity of the participating exchanges may disappear, which can cause significant political problems.⁷ An example of a merger is Euronext (Box 3); indeed Euronext has been in negotiations with at least one of the larger EUAC stock exchanges. Also, mergers are extremely hard to consummate, and once agreed, even harder to implement successfully.

Box 3: Merger strategies: Euronext⁸

Euronext is the result of a merger which was carried out on 22/9/2000 between Société des Bourses Françaises SA (SBF), Amsterdam Exchanges NV (AEX), and Société de la Bourse de Valeurs Mobilières de Bruxelles SA/Effectenbeursvennootschap van Brussel NV (BXS).

The three stock exchanges became wholly-owned subsidiaries of Euronext NV, a newly created Dutch holding company, and changed their names to Euronext Paris, Euronext Amsterdam and Euronext Brussels. Following the merger, Euronext NV became 60% owned by former SBF shareholders, 32% owned by former AEX shareholders and former holders of participating certificates issued by AEX, and 8% owned by former BXS shareholders.

Although companies remain listed in their original market, all financial instruments are to be traded on a single integrated trading platform, and listing and trading rules will eventually be harmonized, resulting in a single market rulebook. Issuers are subject to supervision and monitoring rules, information obligations and public offer obligations set by the regulators in the country in which they are listed.

Following the merger, the three exchanges retained their separate legal status from a regulatory point of view. Following its creation, Euronext subsequently bought up the London International Financial Futures Exchange, and also merged with the Lisbon Stock Exchange.

Nevertheless, a merger between exchanges does have three very important advantages over any linkage. First, the distribution of any gains between merged exchanges becomes irrelevant, as they all share in any such gains via their equity in the merged vehicle. In

⁷ This is not necessarily the case: Euronext NV, with its subsidiary exchanges Euronext Amsterdam, Euronext Brussels, Euronext Lisboa, and Euronext Paris, provides an example of how a merged institution can still retain the identities of its constituent parts.

⁸ This is drawn from www.euronext.com.

contrast, there is often friction between cooperating exchanges about how to divide up any gains obtained from linkages. Second, the credibility of agreements between the elements of a single merged exchange is typically much higher than could obtain in any contractual agreements between different exchanges. This is because, while still possible, it is difficult to unwind such mergers. Third, unlike contracts between linkages, those between merged exchanges do not have to be fully specified in advance. Internal incentives are normally sufficient for the different components of a merged entity to work together even in changing circumstances.

An example in the context of the EUAC of a merger between exchanges has been that of HEX (see Box 4), which has taken over the exchanges in two out of the three neighbouring Baltic countries. It is too early to tell how this will affect the markets in these countries.

Box 4: HEX⁹

HEX is the Finnish stock exchange group that operates the stock exchange and central securities depository in Finland, Estonia and Latvia. In order to achieve growth and profitability through internationalization, a key goal of HEX is to be the best place to trade Baltic securities. In order to do this, HEX has pursued a policy of purchasing strategic stakes in the market infrastructure institutions in the Baltic countries. The reasons for the Baltic exchanges joining HEX are illustrated by the Riga Stock Exchange's main objectives, which were to attract a strategic partner or join an alliance, in order to obtain a solid investor base, and to transfer the know-how of an experienced partner to the Latvian market. When the Riga Stock Exchange saw that NOREX was not going to deliver these objectives, it decided to join HEX.

In Estonia, HEX acquired strategic ownership of the Tallinn Stock Exchange (TSE) in April 2001, and now owns 61.6% of the exchange. The Estonian CSD is owned 100% by the TSE. In Latvia, HEX bought 92.98% of the Riga Stock Exchange in August 2002, which in turn is the sole owner of the Latvian Central Depository. HEX has also been in negotiations with the National Stock Exchange of Lithuania.

The Tallinn Stock Exchange and the Riga Stock Exchange still operate independently, but under the brand of HEX. The intention is to provide trading and settlement facilities on a single electronic platform. On 25/2/2002 the TSE and its member firms adopted the trading system of HEX, thus creating a common trading environment for securities listed on the Tallinn and Helsinki exchanges. The official trading currency is the euro, but investors can still pay for transactions in Estonian kroons.

⁹This is drawn from <http://www.hexgroup.com/en/index.html>, <http://www.hex.ee/english/> and <http://www.rfb.lv/>.

5 CONCLUSIONS

Stock exchanges in EUACs face many challenges. While there has been some growth in terms of capitalization and volume for Slovenia and Slovakia in recent years, and market capitalization has been roughly stable in Hungary and Poland, many EUAC exchanges have lost listings. Stock exchanges in EUACs still remain small by international standards and face competition from nearby financial centres. Internationalization — in the form of cross-listing of the major EUAC companies on international exchanges — is affecting all EUAC exchanges. Although internationalization may have had positive effects on local liquidity initially, experiences suggest that this may not last and that local liquidity may start to decline.

Without some substantive changes in strategy some EUAC stock exchanges are likely to go through a period of decline as large corporations continue to seek foreign listings, as trading is diverted abroad, and as the local market activity of the few remaining smaller corporations is reduced. EUAC stock exchanges will almost certainly undergo major restructuring within the next few years. Unfortunately there are no easy options available to them. To stay economically viable they need to cut costs, yet this may lead to even less attractive markets. Outsourcing and regional linkages with other exchanges could be pursued, but these are hard to agree and implement successfully, and most of them have failed. Regional mergers may have the greatest chance of being viable in the long run, although these are also extremely difficult to negotiate, since there are typically major political obstacles. At the same time, the fact that the EUAC stock exchanges are still new suggests that they will face less resistance to meet and face these challenges. They also have been able to leapfrog using modern trading systems and other infrastructural advances, thus facilitating quicker progress.

Although stock exchanges in EUACs may not have a comparative advantage in offering capital-raising, listing and trading services for large firms, the majority of small and medium-sized firms will not be able to go directly overseas. Since these firms are important for economic growth and need to raise capital, a decline in local market activity can be costly for countries. Policy responses can vary. One model is a more proactive

policy specifically aimed at bringing firms for the first time to a public market. This type of special market has been tried many times, however, not least in the EU, and it has been difficult to sustain on a long-term basis. Regardless of the option chosen, the financing of new and expanding firms will require the development of venture capital firms, commercial banks, non-bank financial institutions, and institutional investors. In order for these forms of financial intermediation to work, major innovations may be required in the legal, and institutional set-up needed to support an active first-stage financing industry.

6 REFERENCES

- Claessens, S., Klingebiel, D., and S.L. Schmukler, (2002a) The Future of Stock Exchanges in Emerging Markets. *Brookings-Wharton Papers on Financial Services*, pp.167-202, also available as CEPR Discussion Paper 3301
- Claessens, S., Klingebiel, D., and S.L. Schmukler, (2002b) Accessing International Equity Markets: What Firms from Which Countries Go Abroad?, mimeo, University of Amsterdam and World Bank
- Karolyi, A., (1998) ‘Why do Companies List Shares Abroad? A Survey of the Evidence and its Managerial Implications’, *Financial Markets, Institutions, and Instruments*, Vol. 7(1), pp.1-60
- Karolyi, A., (2003) The Role of ADRs in the Development and Integration of Emerging Equity Markets, mimeo, Ohio State University
- Lee, Ruben, *Changing Market Structures, Demutualization and the Future of Securities Trading*, 5th Annual Brookings/IMF/World Bank Financial Markets and Development Conference (4/2003)
- Lee, R., (1999) *What is an Exchange? The Automation, Management and Regulation of Financial Markets*. Oxford University Press
- Lee, R., (1/2001) *Promoting Regional Capital Market Integration*. Prepared for Inter-American Development Bank
- Lee, R., (2002) *The Future of Securities Exchanges*. Ch. 1, Brookings-Wharton Papers on Financial Services, Robert Litan & Richard Herring (eds.)
- Levine, R. and S.L. Schmukler, (2003) Migration, Spillovers, and Trade Diversion: The Impact of Internationalization on Stock Market Liquidity, mimeo, University of Minnesota and World Bank
- Moel, A., (2001) The Role of American Depositary Receipts in the Development of Emerging Markets. *Economia* Vol. 2(1), pp.209-273
- Pagano, M., Roell, A., and Zechner, J., (2002) The Geography of Equity Listing: Why Do European Companies List Abroad? *Journal of Finance* Vol. 57(6), pp.2651-2694
- Szeles, N. & G.M. Wiesaw, (2000) *Isolation or Association: A Difficult Choice for a Regional Exchange – The Example of the Budapest Stock Exchange*. Josph de la Vega Prize, FESE & ECMI
- Rozucki, W., (7/2001) ‘Emerging Stock Markets in Central Europe: Where do We Stand?’ Ch. 12, pp. 139-144, in *Financial Transition in Europe and Central Asia: Challenges of the New Decade*, Lajos Bokros, Alexander Fleming & Cari Votava (eds.) World Bank

7 APPENDIX: LARGEST COMPANIES

Largest Companies (by market capitalization)

Companies	Market Capitalization February 2003 - US\$ million	Listed at Home	Listed in NY	Listed in London
BULGARIA				
Bulgartabac Holding	118	Yes	No	No
LukOil Neftochim	66	Yes	No	No
Sopharma	56	Yes	No	No
Blagoevgrad BT	48	Yes	No	No
Albena	36	Yes	No	No
CROATIA				
Pliva	1,124	Yes	Yes	Yes
Privredna banka Zagreb	436	Yes	No	No
Podravka	163	Yes	No	No
Rijeka Banka	82	Yes	No	No
Karlovačka pivovara	65	Yes	No	No
CZECH REPUBLIC				
Cesky Telecom	2,934	Yes	Yes	Yes
Komerčni banka	2,716	Yes	Yes	Yes
CEZ	1,860	Yes	No	No
Philip Morris CR	715	Yes	No	No
Unipetrol,	247	Yes	No	No
ESTONIA				
Hansabank Ltd.	1,323	Yes	No	No
Eesti Telekom	803	Yes	No	Yes
Norma Ltd.	61	Yes	No	No
Merko Ehitus Share	51	Yes	No	No
Saku Brewery	36	Yes	No	No
HUNGARY				
Matav	3,395	Yes	Yes	No
OTP Bank	2,730	Yes	Yes	No
MOL	2,122	Yes	Yes	No
Richter Gedeon	1,141	Yes	Yes	No
TVK	390	Yes	Yes	Yes
LATVIA				
Latvijas Gaze	240	Yes	No	No
Latvijas Kugniecība	90	Yes	No	No
Ventspils nafta	73	Yes	No	No

Valmieras stikla skiedra	11	Yes	No	No
Grindeks	7	Yes	No	No
LITHUANIA				
Lietuvos Telekomas	221	Yes	Yes	Yes
Lietuvos dujos	179	Yes	No	No
Lietuvos energija	161	Yes	No	No
Rytu skirstomieji tinklai	134	Yes	No	No
Vakaru skirstomieji tinklai	109	Yes	No	No
POLAND				
Telekomunikacja Polska	4,168	Yes	Yes	Yes
Bank Pekao	3,736	Yes	Yes	Yes
Bank Handlowy Warszawic	1,856	Yes	Yes	No
Polski Koncern Naftowy Orlen	1,842	Yes	Yes	Yes
Bank Przemyslowo-Handlowy	1,614	Yes	Yes	Yes
ROMANIA				
SNP Petrom	1,275	Yes	No	No
Banca Romana Pentru Dezvoltare	824	Yes	No	No
Automobile Dacia Pitesti	225	Yes	No	No
Combinatul Siderurgic Sidex	157	Yes	No	No
Lafarge Romcim	115	Yes	Yes	No
SLOVAK REPUBLIC				
Slovnaft	435	Yes	Yes	No
Nafta	125	Yes	No	No
Vseobecna uverova banka	118	Yes	No	No
Slovakofarma	63	Yes	Yes	No
Vychodoslovenske zeleziarne	40	Yes	No	No
SLOVENIA				
KRKA	667	Yes	No	No
PETROL	383	Yes	No	No
MERCATOR	348	Yes	No	No
GORENJE VELENJE	236	Yes	No	No
Sava	191	Yes	No	No