Financial Market Integration in Central-Eastern Europe: Trivia and Puzzles

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Since the beginning of economic transition in the early 1990s, financial markets in Central-Eastern European economies have been gradually integrated into global financial markets. The general view is that EU accession accelerated this process, in fact some even claim that the acceleration started well before the May 2004 enlargement when 10 new members joined the EU. This short note presents a few empirical findings on the outcome of this process. Some of the findings confirm the general view, but we also find a few puzzles suggesting that markets are not quite perfect yet: correlation coefficients change significantly when we move from daily to weekly data and the delay in reacting to shocks on global equity markets is significantly longer in CEE than in Western Europe and the US equity markets.

Financial Integration Seems to Work, But It Is Not Yet Over

By looking at the graphs in the *Markets at a Glance* section on the last page, one can easily detect common trends and shifts in FX rates, equity prices or interest rates in CEE. On this page, Figure 1, comparing the correlations of daily FX rate changes in CEE, confirms that correlations have become significantly stronger after 2004. Figure 2, suggests the same for equity markets though to a much lesser extent, providing further support to previous findings that equity markets started to integrate in late 2001 (Dvorak and Podpiera, 2005). The fact that no similar increase can be observed in other countries on the periphery of the EU support the general view that EU accession was the main factor accelerating financial market integration in CEE. Finally, Figure 3 presents similar evidence for fixed income markets, though it also shows that being outside the euro area matters a lot in this respect. Put differently, CEE fixed income assets still have a few years left from their useful life as risk diversification instruments, well maybe more in Hungary than elsewhere.

Figure 1. Correlations across Currency Markets

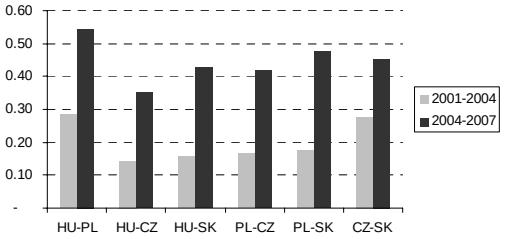


Figure 2. Correlations across Equity Markets

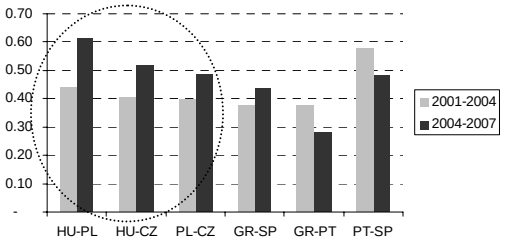
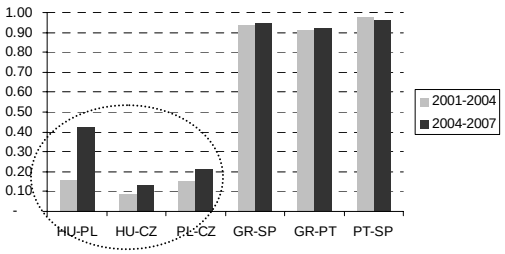


Figure 3. Correlations across Bond Markets



Financial market integration works not only among countries but also across markets. From modern portfolio theory we know the crucial role correlation (or the lack of it) plays in portfolio risk diversification. As Figure 4 shows, similarly to the cross-country correlations, cross-sector correlations in Hungary have also increased recently. While in theory, assuming random walk behavior, the correlation coefficients should not depend on the measurement horizon, we can

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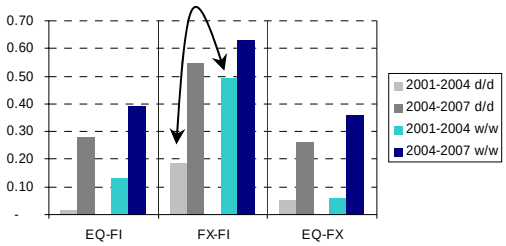
observe significant differences between correlations calculated on daily and weekly bases. While these differences got smaller in some cases, such as between FX and fixed income markets, they remained sizable and in fact even increased in some places. There can be several explanations for such phenomena, for example the composition of investors with vastly different capacities (and cost) of monitoring CEE markets vary greatly across markets, but in general these findings suggest that markets are not yet perfect in CEE. This is a phenomenon that deserves attention not only by researchers but also policy makers, as unexpected (and unknown) delays in the reactions of local markets to global (regional) shocks may well alter the way future financial crises will unfold.

Figure 4. Cross-Sector Correlations in Hungary: Daily and Weekly Returns



But Are Equity Traders in New Europe Getting behind the Curve?

Traditional theory assuming perfect markets predicts that yesterday's news is of no use to financial markets. In many cases, however, empirical evidence suggests otherwise. European equity markets provide yet another example. Relationships with the US market seem rather different for new and core old Europe markets. On the former, delays in incorporating new information seem longer. What is most puzzling, however, is that delays in new Europe seem to have gotten even longer after EU accession.

Figure 5 shows the correlations between equity market index changes in the US and selected old and new Europe countries. The correlation coefficients are between the change on calendar day *t on European markets and changes* on calendar days *t* and *t*-1 on the US market. MSCI local currency indices are used as an indicator of the daily performance of the selected markets. Given the time difference between the US (EST) and Europe (GMT and CET), it is not surprising that we find positive correlations between both same-day and lagged returns. For comparison, Figure 6 shows the same correlations with the UK: there are no significant values for lagged returns, that is, information is fully incorporated by the end of the day. Also, it is not surprising to find that the correlations for core old Europe countries, which are much more closely integrated into global markets, are higher than those for new (or non-core old) Europe. What is surprising, however, is that for new Europe (and Greece) lagged correlations with the US are higher than the same-day ones, which is not true for core old Europe markets. That is, it seems information is processed more slowly by traders in new Europe.

Figure 5. Correlations between European and US Equity Markets, May 2001-January 2007

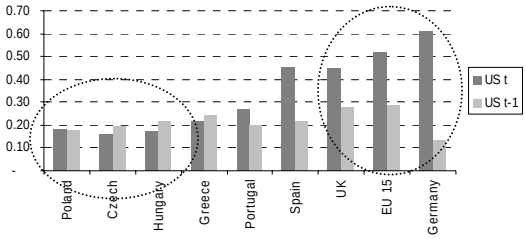
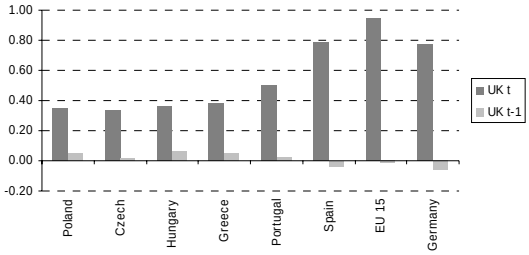


Figure 6. Correlations between European and UK equity markets, May 2001-January 2007



The real puzzle, however, is that lagged correlations for new Europe markets became even larger after EU accession in May 2004, while there is no change for core old Europe countries in this regard (Figures 7 and 8). As pointed out before, one would have expected EU accession to accelerate the integration of equity markets of new Europe into global markets, making them more and not less similar to core old Europe markets. Results of basic regressions (Tale 1) further confirm that markets in new and core old Europe are different in this regard.

Figure 7. Correlations between European and US equity markets, May 2001-May 2004

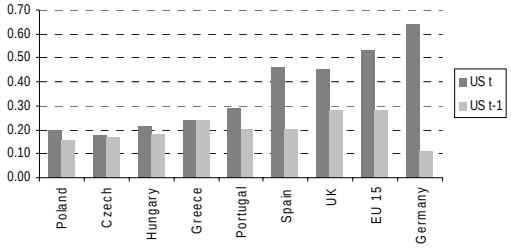


Figure 8. Correlations between European and US equity markets, May 2004-January 2007

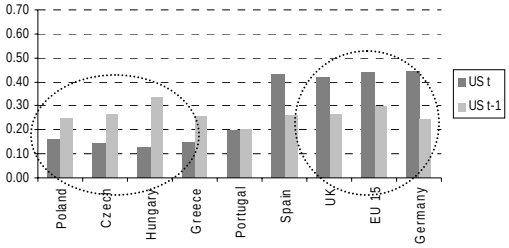


Table 1. Regression estimates for equity index performance

$$\ln\left(P_t^{dom} / P_{t-1}^{dom}\right) = c + \beta_1 \ln\left(P_t^{US} / P_{t-1}^{US}\right) + \beta_2 \ln\left(P_{t-1}^{US} / P_{t-2}^{US}\right) + \varepsilon_t$$

Period		Pol	Cze	Hun	Gre	Por	Spa	UK	EU15	Ger
May, 01-Jan, 07	c	0.00	**0.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	US t	**0.26**	**0.23**	**0.25**	**0.27**	**0.24**	**0.59**	**0.49**	**0.59**	**0.94**
	US t-1	**0.26**	**0.27**	**0.31**	**0.30**	**0.18**	**0.29**	**0.31**	**0.34**	**0.23**
	R^2	*0.07*	*0.06*	*0.08*	*0.11*	*0.12*	*0.26*	*0.29*	*0.36*	*0.39*
May, 01-May, 04	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	US t	**0.25**	**0.21**	**0.24**	**0.27**	**0.25**	**0.60**	**0.50**	**0.61**	**1.01**
	US t-1	**0.20**	**0.20**	**0.21**	**0.28**	**0.18**	**0.28**	**0.32**	**0.34**	**0.21**
	R^2	*0.06*	*0.06*	*0.08*	*0.12*	*0.13*	*0.26*	*0.29*	*0.37*	*0.43*
May, 04-Jan, 07	C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	US t	**0.33**	**0.31**	**0.31**	**0.24**	**0.18**	**0.51**	**0.44**	**0.48**	**0.62**
	US t-1	**0.52**	**0.57**	**0.78**	**0.42**	**0.19**	**0.31**	**0.28**	**0.33**	**0.35**
	R^2	*0.09*	*0.09*	*0.13*	*0.09*	*0.08*	*0.26*	*0.25*	*0.29*	*0.26*

Note: Statistically significant coefficients are bolded.

References

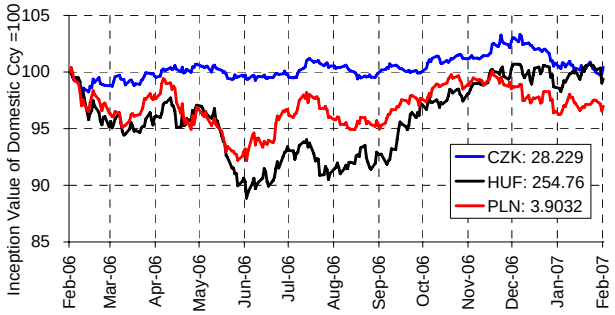
Dvorak. T and R. Podpiera (2005), European Union enlargement and equity markets in accession countries, ECB Working Paper Series 552, November 2005.

Markets *at a* Glance

February 28, 2007

Currency Markets

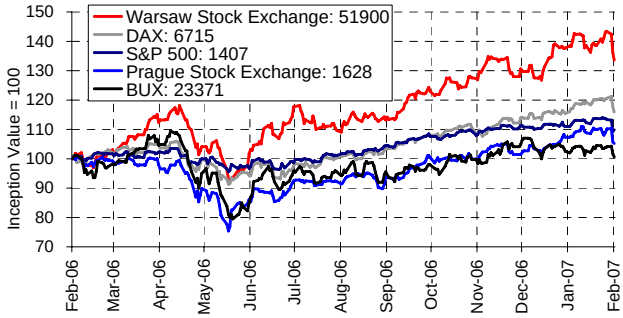
Value of Domestic Currency vs. Euro



Source: Bloomberg

Equity Markets

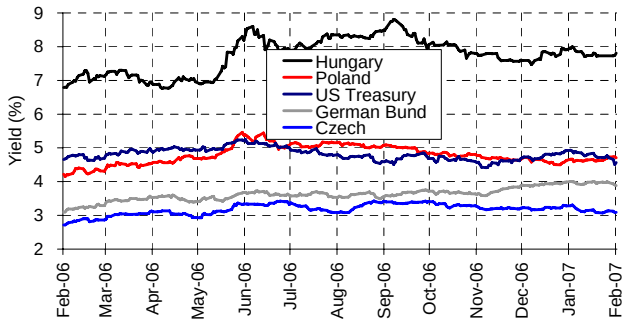
Representative Stock Indices



Source: Bloomberg

Domestic Bond Markets

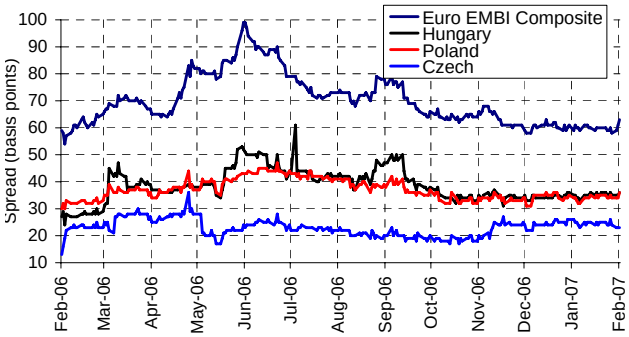
3-Year Government Bonds



Source: Bloomberg

Euro-Denominated Sovereign Bonds

Government Spreads



Source: J.P. Morgan, Bloomberg

Developments on Central Eastern European financial markets continued to be fascinating. The stability of the Czech markets and a unique decoupling of medium-term CZK yields from euro yields suggest that it is mainly the fiscal side that keeps the country away from the euro area. The PLN and HUF, the dwa bratanky, however, have remained coupled despite large differences in medium-term bond yields and stock performances. The notable appreciation of the HUF over the past few months is a clear indication of optimistic market views on the short-term prospects for fiscal consolidation, but domestic yields remained significantly higher than in other EU countries. **Currency markets**: while in the past 12 months CZK remained stable, PLN and HUF had a roller-coaster ride over the same period. As a result, HUF and PLN volatilities have been much higher, 9% and 8%, compared to 4% for CZK. Over the first two months of 2007, however, all of them depreciated: HUF -1.3%, CZK -2.5% and PLN -1.7% YTD. **Equity markets** suffered significant sell-off on February 27 as a reaction to a fall of the Chinese equities. Over the past 12 months, WIG exhibited an impressive price increase of 34%. The first two months of 2007 was good overall, though the end-February drop pushed down the cumulative year-to-date figures significantly: WIG +3.0%, Prague +2.5%, DAX +1.8%, S&P 500 -0.8% and BUX -5.9% YTD. **Sovereign spreads** of the three CEE countries increased modestly by 6-10 bps over the past 12 months, and moved up slightly in 2007 by 1-5 bps. Hungarian and Polish bonds spreads moved in tandem most of the time in the past year; the deviations in June and September coincided with the rating revisions of Hungary by Moody's and the Standard and Poor's.

Latest Economic Releases: Hungary

Indicator	Last Release	Actual Value	Next Release	Survey Median
NBH Base Rate	2/26/07	8.00	3/26/07	
CPI Monthly	2/14/07	1.20	3/13/07	
CPI Yearly	2/14/07	7.80	3/13/07	
PPI Monthly	1/31/07	-0.90	3/2/07	
PPI Yearly	1/31/07	4.50	3/2/07	
Avg Gross Wages Y/Y	2/20/07	11.90	3/20/07	
GDP YoY (Constant Prices)	2/14/07	3.20	3/9/07	
Industrial Production M/M	2/15/07	2.20	3/8/07	
Industrial Production Y/Y	2/15/07	14.00	3/8/07	
Current Account Q/Q (EUR Mn)	9/30/06	-1,129.00	4/2/07	
Foreign Trade Bal. M/M (EUR Mn)	2/8/07	-80.60	3/2/07	
Consolidated Govt Budg (HUF Bn)	1/31/07	-196.10	3/6/07	
Unemployment Rate	2/28/07	7.50	3/28/07	
PMI SA	2/1/07	54.60	3/1/07	
Retail Trade Yearly (%)	2/23/07	3.27	3/23/07	

Sources: Bloomberg Economic Releases