Does Regulation on Default Asset Allocation Matter? – The Hungarian Experience of the Fully-Funded Defined Contribution Pension Scheme

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1. The Performance of the Mandatory Fully-Funded Defined Contribution (FF DC) Scheme in Hungary

The portfolios of the mandatory FF DC pension plans in Hungary are typically characterized by fairly similar asset allocation profiles across the 18 plans, and these portfolios are dominated by Hungarian government bond portfolio investments (see Figure 1 and Figure 2). These homogeneous asset allocation profiles emerged in an environment where fund managers are not constrained to design more "aggressive" (or "equity heavy") portfolios. Do these "conservative" allocations serve the interest of pension plan members when we know that pension savings should follow the benchmark patterns for long-term savings? Could one make an argument for regulating default portfolio allocations given that competition among the pension funds arguably play little role in a mandatory participation environment. The case of Hungary, alongside the story read from long time series data from the US, makes us raise these questions.

In this note we present some preliminary results based on our research addressing these and other related questions.

Figure 1. Historical Asset Allocation of a Typical Hungarian Pension Fund

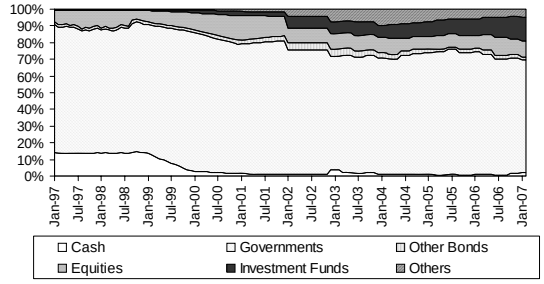
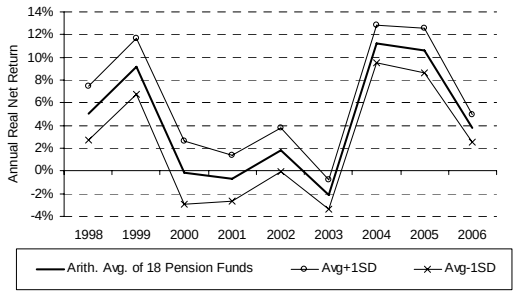


Figure 2. Year-by-Year Real Return of the Second Pillar in Hungary



The available history of asset allocation and asset return from Hungary is fairly short. Over the past 10 years, we estimate that the "average" pension investment had an annualized gross return of 12.3%, and a net return of 11.3% on a nominal basis, or 3.6% gross return and 2.6% net return on a real basis.

2. New Regulation on Life-Cycle Portfolios

New legislation from 2006 is expected to dramatically change the asset allocation of pension funds in Hungary by mandating age-dependent default portfolios. Depending on time remaining until retirement each the account balances of each individual will be invested in "growth", "balanced" and "classic" portfolios.

Table 1. Main Parameters of the New Regulation

Product	Classic	Balanced	Growth
Time horizon	0-5 years	5-15 years	15- years
Equity Allocation	Less than 10%	10-40%	Over 40%
Real Estate Allocation	0%	Less than 10%	Less than 20%
Venture Capital Allocation	0%	Less than 3%	Less than 5%
Derivatives	0%	0%	Less than 5%

Table 2. Asset Allocation for Hypothetical Age-Dependent Portfolios

Portfolio	Time Horizon	Cash	Governments	Equities
Growth	15-30 years	0%	40%	60%
Balanced	5-15 year	5%	70%	25%
Classic	0-5 years	40%	60%	0%

According to our estimation, the historical gross nominal return of the Classic, Balanced and Growth portfolios between 1996 and 2006 would have been about 16.2%, 14.3% and 12.4% respectively. The net real return would have been 6.2%, 4.5% and 2.7% according to our estimation.

[1] MENA Human Development Group and Treasury of the World Bank. The findings, interpretations, and conclusions are those of the authors and should not be attributed to the World Bank, their Executive Boards of Directors, or the governments they represent.

3. Risk-Return Trade-Off: from a Historical Perspective

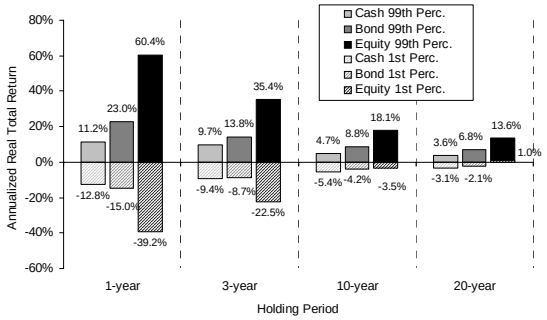
Capital markets in the modern sense did not exist in Hungary in the decade prior to 1990, and the mandatory pension fund allocations started in 1998. The length of the data time series is clearly not long enough to draw conclusions about long-term capital market risk and return patterns. That is why we use long-term US data series to answer the following questions:

1. How do the age-dependent portfolios compare based on different risk definitions? For example, how do they compare on different time horizons if our concern is either nominal or real capital preservation?
2. How sensitive are these portfolios to the entry point to the market?
3. How does a sequence of the three age-dependent portfolios over a 30-year cycle compare historically with an age-independent portfolio with equivalent asset class exposure?
4. What is the overall impact of administrative and management fees?

We address these questions using U.S. market data between 1925 and 2006:

1. *Over a short investment horizon*, the low-risk or risk-free asset is typically represented by short-term Treasury bills. The short-term investment horizon is relevant for pension savings when the individual is close to retirement. Comparing the annual volatility of the nominal return of T-Bills or cash deposits to that of equities, we indeed find a huge difference between these asset classes. In conjunction with this, we also find that the frequency of negative nominal return of equities on a year-to-year basis is significant (26%), whereas that of cash deposits is virtually zero. If our concern, however, is not the nominal but the real return, or real capital (i.e. purchasing power) preservation, we find that the frequency of annual negative real return is fairly similar for both cash and equities. The magnitudes of underperforming inflation in the these two cases on a year-to-year basis, however, are dramatically different: the loss that one can suffer on equities is dramatically more severe than that on cash (the lowest 1st percentile return over the 80 years history is -12.8% versus -39.2% respectively). By expanding the time horizon to 10-year or 20-year, the picture becomes quite different: the frequency of negative real return becomes significantly higher for the case of cash, and the accumulated shortfall is also more severe for pure cash investors – based on the history of 1925-2006.

Figure 3. Historical Real Return Ranges[2]



For instance, over any 20-year period between 1925 and 2006, the lowest 1st percentile cumulative return of equities over inflation was +19.6%, whereas the same figure for cash was -46.5%[3]. This phenomenon is explained by the higher risk premium on equity investments, as well as the mean reversion phenomenon that analysts typically find. The questions whether mean reversion will persist in the future, and whether the performance of equities in Hungary will be similar to equity returns in the US are beyond the scope of this note. In fact, had we analyzed the performance of the Japanese equity market, we would have arrived at more pessimistic conclusions about equities.[4]

Table 3. Downside Risk Frequencies
1925-2006

Time Horizon	Freq. of Negative Real Return			Freq. of Real Return Less Than 3%		
	Classic	Balanced	Growth	Classic	Balanced	Growth
1-year	34.97%	27.97%	30.27%	63.15%	43.84%	39.35%
3-year	31.91%	18.74%	23.02%	64.78%	43.58%	34.69%
10-year	34.24%	18.82%	11.76%	64.82%	42.82%	23.06%
20-year	30.41%	0.68%	0.00%	78.22%	58.90%	21.51%

By analyzing the long-term historical performance of the generic "Classic", "Balanced" and "Growth" portfolios, we may arrive at similar conclusions. The "Classic" portfolio, at any time horizon, exhibited a roughly 1/3 chance of underperforming inflation. The frequency of negative real returns of the "Growth" portfolio, on the other hand, exhibited

[2] History based on Ibbotson Associates data
[3] The worst period for cash was the post-WWII period and the '50s. Equities had low returns during the Great Depression, the WWII era, the early-70s and during the 2000-2002 bubble burst.
[4] The relevance of the US data is strengthened by the data series presented in Jeremy Siegel's influential book "Stocks for the Long-Run" pointing to remarkable similarities of long-term equity return and volatility across countries.

a decreasing pattern as we extended the investment horizon. Furthermore, if we measure the historical shortfall frequency relative to a 3% real return target, a benchmark return that traditional pay-as-you-go pension systems are capable to provide, the chance of not achieving this target increased in the case of the "Classic" portfolio as we expanded the measurement horizon. The "Growth" portfolio, on the other hand, achieved the annual 3% real return benchmark with an increasing frequency over the past eighty years.

While frequency numbers show one aspect of the investment risk, the potential size of the loss in the purchasing power is equally or even more important. Over a 1-year and 3-year period – based on our historical sample – the generic Growth portfolio could have suffered more severe losses compared to the "Classic" portfolio. Over a longer, say, 20-year period, on the other hand, even in the lowest 1st percentile case, the "Growth" portfolio could have grown by a cumulative 13.33% over inflation (0.63% annualized), whereas the "Classic" counterpart could loose more than one third of the purchasing power by the end of a 20-year cycle. While we use these historical figures mainly for illustration purposes, we still can conclude that the relative riskiness of these portfolios may exhibit quite different picture if we measure risk over a short versus long time horizon, as well as if we measure risk on a nominal versus real basis. *In other words, the convention wisdom that equity is expected to provide a higher real return on the long-run can be extended: equity appeared to be less risky on the long-run according to several relevant risk measures.* Now, it is time to focus on various dimensions of risk assessment.

2. *Are Equities safe on the long-term?* While we can observe that cash or government bond dominated portfolios are by far not risk-free over the long term on a real capital preservation basis, and such portfolios were not suitable to achieve, say, a 3% real return target, we also have to call the attention to another aspect of investment risk.

While long-term historical data analysis may make us confident in equity investments to achieve real growth, and we can empirically demonstrate that even the devastating impact of market crashes is compensated over time (equities[5] in the US never had a negative real return over any 20-year period between 1925-2006), we also have to bear in mind that all these observations are pure empirical facts, and there is no guarantee against any losses over 20-year in the future.

We also have to recognize that while the impact of a market crash is washed out over time in history, an individual's pension saving may suffer significant losses during these periods. While the 1st percentile lowest returns are only the extreme statistics for us, they were hard realities to many individuals in the history. In fact, the performance of an individual's saving portfolio is quite sensitive to the entry point to the market. If someone starts saving in a period when the market has just reached a peak, just at the beginning of a bearish period, her portfolio may start with significant losses, and it may take for years until the portfolio recovered from its losses. While the "no negative real return over 20-year" empirical rule stands in our historical sample, we have to bear in mind that in certain periods it may have taken more than 10 years to achieve a positive real return.

The risk of entering market at peak can be illustrated by the "drawdown" measure of risk that compares the value of the investment to its historical highest level. The intuition behind this measure is that once we set up our investment portfolio, any kind of shortfall relative to the highest level of wealth we ever achieved will make us disappointed. This measure can be naturally used to illustrate the worst kind of – and hopefully only temporary – situation: how much we can loose if we enter the market at the peak. While losses of well-diversified equity portfolios always recovered by the end of any 20-year period in the U.S. between 1925 and 2006, losses of the Great Depression might have been severe even if one could wait until the end of a hypothetical 20-year period, and surely could have been devastating if she could not. The fact that contributions to a pension account are distributed over time has an entry-point diversification impact, smoothing the purchase price of equities over time.

3. *Lots of equities at young age, or moderate level of equities for a lifetime?* The question is similar to "100% equities half of the time, or 50% equities all the time? We can easily compare two strategies over a 30-year investment horizon: the age-dependent asset allocation that pretty much reduces the proportion of equities as the time horizon shortens, and an unconditional asset allocation in which case the asset weights are basically equal to the time weighted-average allocations of the age-dependent strategy (8.33% cash, 53.33% government bonds and 38.33% equities in our case.)

Table 4. Nominal Performance and Risk Over any 30-year Periods

History: 1926-2006	Dynamic SAA	Equal SAA
Average Return (annual.)	7.75%	7.77%
St. Deviation of Cum. Return	1.70%	1.62%
Lowest 1% Return (annual.)	3.51%	5.45%
Worst Drawdown (cumul.)	-53%	-34%
Worst Shortfall from Absolute Peak at the End	-3.1%	-15.6%

If we choose either the volatility or the 1st percentile lowest return as risk measures, we see

[5] Assuming broadly diversified equity portfolios.

that the unconditional asset allocation is the lower risk alternative. In addition, if we use the worst case drawdown risk measure that compares the investment value at any time to the highest level of wealth reached up to that point within the 30-year saving cycle, again, we would choose the unconditional allocation. For clarification, the worst drawdown may take place at the very beginning of a 30-year cycle, and by the end of the cycle the portfolio may very well recover. Given that the age-dependent strategy is more equity-heavy in the first 15 years of the 30-year cycle, it is not surprising that the possible shortfall can be more severe in the age-dependent portfolio.

4. How much do asset management costs "eat into" the savings of FF DC pension plane members? Or how much is 1%? Based on the latest report of the Hungarian Financial Supervisory Agency, the capital weighted average difference between the gross and net returns for 2005 and 2006 of the 18 private pension funds is 0.97%, or roughly 1%. While the average net returns intuitively differ according to the pattern of the assumed level of costs, the historical frequencies of underperforming a real 3% target return take a dramatically different picture:

- With no costs, there was historically only a 21% chance to miss an annual 3% real return target;
- At the other end, assuming 1% annual cost – which is the closest to the case of Hungary – the same historical frequency was more than 2/3; more precisely 70%.

Given the excess generosity of the pay-as-you-go component of the Hungarian pension system, plan members are likely to be disappointed with their pension investment returns in this high management cost environment! The lack of true competition among funds in the field of mandatory plans seem to keep the plan members exposed to high asset management costs and high risk of underperforming reasonable expectation benchmarks.

5. *What is the morale of the story?* The pension reform in Hungary in 1997-98 contributed to improving the long-term sustainability of the system with introducing a mandatory FF DC scheme. However, the regulatory environment of the new pillar has been incomplete and/or inadequate in certain ways. In hindsight, it was not wise to believe that market forces would bring about optimal asset allocations serving plan members. The new life-cycle default portfolio allocation is a clear improvement. However, the high asset management costs continue to excessively decrease the net real returns FF DC plan members can gain in Hungary.

Table 5. Summary Statistics for Age-Dependent Portfolio with Different Cost Level

	Cost=1.0%	Cost=0.50%	Cost=0.25%	No cost
Nominal Average	6.68%	7.22%	7.48%	7.75%
Average Over Inflation	2.64%	3.16%	3.42%	3.67%
Freq. Real Ret.<3%	70.1%	49.6%	37.8%	21.1%

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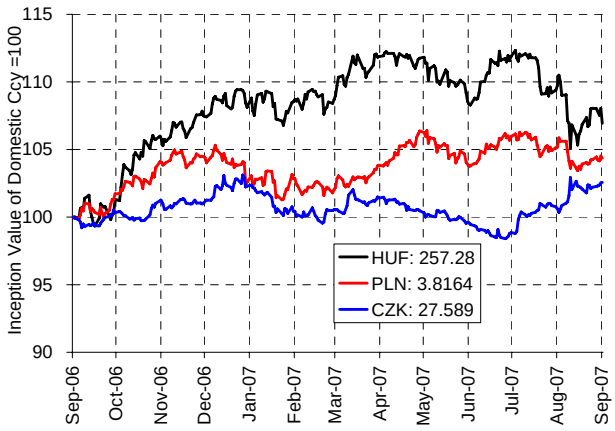
Markets *at a* Glance

September 7, 2007

Currency Markets

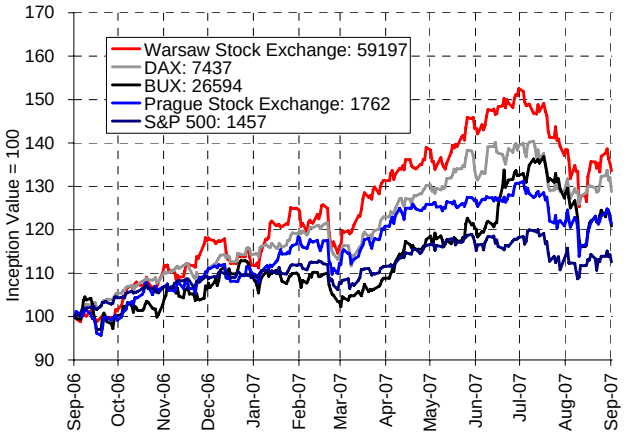
Value of Domestic Currency vs. Euro



Source: Bloomberg

Equity Markets

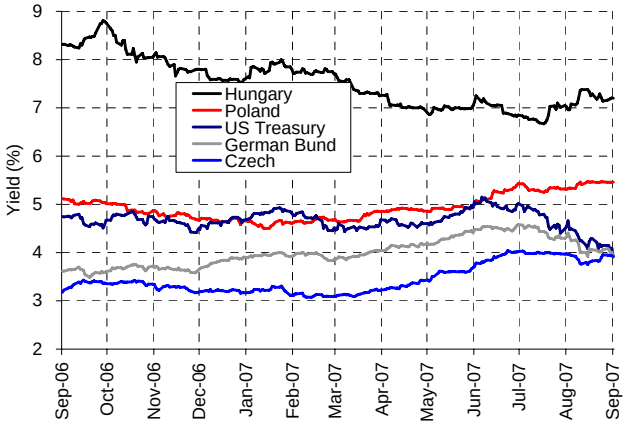
Representative Stock Indices



Source: Bloomberg

Domestic Bond Markets

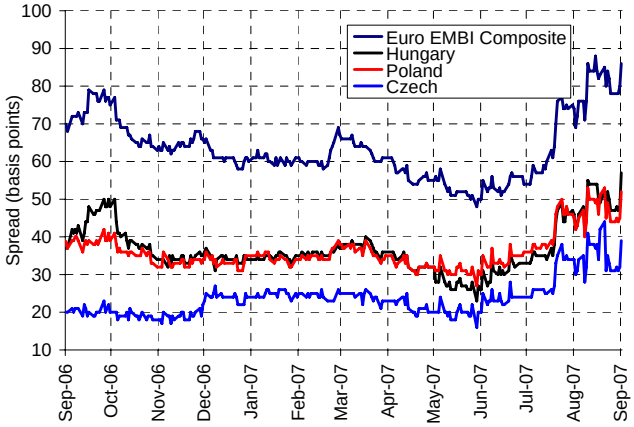
3-Year Government Bonds



Source: Bloomberg

Euro-Denominated Sovereign Bonds

Government Spreads



Source: J.P. Morgan, Bloomberg

Latest Economic Releases: Hungary

Indicator	Last Release	Actual Value	Next Release	Survey Median
NBH Base Rate	8/28/07	7.75	9/24/07	
CPI Monthly	7/31/07	0.00	9/11/07	-0.20
CPI Yearly	7/31/07	8.40	9/11/07	8.20
PPI Monthly	8/30/07	0.40	9/28/07	
PPI Yearly	8/30/07	-2.80	9/28/07	
Avg Gross Wages Y/Y	6/30/07	10.00	9/19/07	
GDP YoY (Constant Prices)	9/7/07	1.20	9/7/07	
Industrial Production M/M	9/6/07	1.40	9/14/07	
Industrial Production Y/Y	9/6/07	9.40	9/14/07	
Current Account Q/Q (EUR Mn)	3/31/07	-1,102.00	9/28/07	
Foreign Trade Bal. M/M (EUR Mn)	9/7/07	-165.00	9/7/07	-190.00
Consolidated Govt Budg (HUF Bn)	9/6/07	-982.30	10/8/07	
Unemployment Rate	8/30/07	7.00	9/27/07	
PMI SA	8/1/07	50.60	10/1/07	
Retail Trade Yearly (%)	8/24/07	-3.60	9/24/07	

Sources: Bloomberg Economic Releases