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Interest Rate (In)sensitivity of Emerging Market Corporate Debt: Economic Analysis based on 2002-2015 Empirical Evidence

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Abstract

Interest rate sensitivity assessment framework based on fixed income yield indexes is developed and applied to two types of emerging market corporate debt: investment grade and high yield exposures. Our research advances beyond the correlation analyses focused on co-movements in yields and/or spreads of risky and risk-free assets. We show that correlation-based analyses of interest rate sensitivity could appear rather inconclusive and, hence, we investigate the bottom line profit and loss of a hypothetical model portfolio of corporates. We consider historical data covering the period 2002 – 2015, which enable us to assess interest rate sensitivity of assets during the development, the apogee, and the aftermath of the global financial crisis. Based on empirical evidence, both for investment and speculative grades securities, we find that the emerging market corporates exhibit two different regimes of sensitivity to interest rate changes. We observe switching from a positive sensitivity under the normal market conditions to a negative one during distressed phases of business cycles. This research sheds light on how financial institutions may approach interest rate risk management, evidencing that even plain vanilla portfolios of emerging market corporates, which on average could appear rather insensitive to the interest rate risk in fact present a binary behavior of their interest rate sensitivities. Our findings allow banks and financial institutions for optimizing economic capital under Basel III regulatory capital rules.

JEL Code: G20, G21, G290, G12, G18, E43, C22, G11, G12, G15, G31

Keywords: Fixed Income, Portfolio Performance Evaluation, Downside Risk Management, Emerging Markets, Corporate Debt, Interest rate sensitivity.

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1. Introduction

As low interest rate environment in most developed countries cannot last infinitely, the likelihood that the U.S. Federal Reserve continues gradually raising interest rates exercises unprecedented pressure on the whole global financial system. The latest IMF Global Financial Stability Report (2015) acknowledges this situation and also points out to the risks of financial instability which continue to rotate toward developing economies. Emerging market vulnerabilities, intrinsically related to the weaknesses of balance sheet structures of corporations and banks, makes firms in these countries more sensitive to capital outflows arising as a result of financial stress and economic downturn.

As financial conditions and risk premiums, accompanying rising policy rates, recover from historically low levels they place significant strain on bank profitability and capital adequacy levels. Not surprisingly one observes a growing volume of scientific research addressing effects of interest rate changes on bank performance and solvency. See, for example Berends et al (2013), Landier et al (2013), Bessis J. (2015), Fuerst et al (2015), Haddad (2015), Neal R. et al (2013 and 2015), Dupoyet B. et al (2016), Gubareva M. & Borges (2016) M., and references therein.

On the other hand, the regulatory bodies try to create the widespread awareness of possible negative impacts of interest rate changes on bank balance sheets and profitability. For instance, the Basel Committee on Banking Supervision in September of this year issued for comment a consultative document entitled “Interest rate risk in the banking book” (2015). In this document, the Committee proposed changes to the regulatory capital treatment and supervision of Interest Rate Risk in Banking Book (IRRBB) which were set out in the Committee’s guidance issued more than a decade ago; see “Principles for the management and supervision of interest rate risk” (2004).

In its turn the European Banking Authority (EBA) in May of this year published “Guidelines on the management of interest rate risk arising from non-trading activities” (2015). The guidance provided in these updated guidelines applies to the interest rate risk arising from non-trading activities (IRRBB), one of the Pillar 2 risks specified in the Capital Requirements Directive (CRDIV) issued by the European Parliament (2013). The Guidelines clarify how institutions should take specific technical aspects into account when assessing IRRBB in their Internal Capital Adequacy Assessment Process (ICAAP). This detailed guidance focuses thematically on five areas of interest risk assessment and control: scenarios and stress testing, measurement assumptions, methods for measuring interest rate risk, governance and identification of interest rate risk, and calculation and allocation of capital to interest rate risk.

The above mentioned documents by the Basel Committee on Banking Supervision and by the EBA, along with the latest Global Financial Stability Report (2015) by IMF comprehensively outline the possible effects of interest rate increases, including changes to net interest margins, balance sheet structure, and values of interest-sensitive assets and liabilities. At this point it becomes especially important to correctly assess an interest rate sensitivity of assets, which is a measure of how much the price of a fixed-income asset will fluctuate as a result of changes in the interest rate environment. The more the price fluctuates, the more sensitive to interest rate is the asset. But what is really important for managing IRRBB is how the prices of assets react on medium term downward or upward trends in interest rate dynamics.

Nevertheless, the interest rate sensitivity of corporate debt is traditionally analyzed in terms of yield sensitivity of corporate bonds to changes in the yield curve of risk-free assets, see Manzoni (2002), Landschoot (2008), Boulkeroua and Stark (2010 and 2013), and references therein. In this context, impacts in price of assets and in a bottom line profit and loss (P&L) of portfolios are obfuscated as researchers main interests are centered on interest rate – credit spread relationship (Merton 1974), Davies (2008), Neal et al (2013 and 2015), Dupoyet B. et al (2016), among other corner stone studies. It is worth noting that research in this field has been focusing at the U.S. domestic bond market.

The fact that U.S. domestic financial market for government and corporate bonds is the biggest in the world explains its attraction for researchers involved in empirical investigations of the relationship between the yield spread on corporate bonds and changes in the yield of U.S. government bonds, see Piazzesi & Schneider (2010), Bauer & Hamilton (2015), Begenau et al (2015), etc. It is not the case in this research as we address the EM corporate debt. Note that the importance of non-U.S. financial markets keeps growing; see Mishkin & Eakins (2015). For example, the level of corporate debt in EM had quadrupled between 2004 and 2014; see the latest IMF Global Financial Stability Report (2015). In respect to the non-U.S. markets we would like to mention a pioneering and rare research of Manzoni (2002) who studied the behavior of yield spreads on an ISMA Sterling Eurobond Index composed by bonds from different markets including Latin America, etc. Thus, additional research into non-U.S. corporate is highly desirable.

Having a slightly different perspective and focusing on P&L sensitivity of bottom lines in EM portfolios, here we attempt to advance empirical research of the joint dynamics of the yields of risk-free U.S. Treasury bonds and risky EM corporate bonds. Hence, in our case, we analyze the interest rate sensitivity as a P&L sensitivity of an EM corporates portfolio, hedged either by short positions in U.S. Treasury bonds to changes in the yields of U.S. Treasury bonds, i.e., to changes in the risk-free interest rates. This work continues our previous research on interdependence between the credit, financial, and liquidity risks and is related to downside risk management and financial stability improvement; see Gubareva (2014), Gubareva & Borges (2014), and Gubareva & Borges (2016).

This paper aims to contribute by providing answers to the following chief question: does it make an economic sense to hedge interest risk of U.S. dollar denominated EM corporate debt by short positions in U.S. Treasury bonds or by pay-fixed receive-float interest rate swaps? We try to respond this question separately for EM investment grade (IG) corporates and for

EM high yield (HY) corporates. The answers to these questions will be of particular importance for interest rate risk management and for dimensioning economic capital to allocate for mitigating this type of risk. Hence our research is potentially important not only for academia community, but also to financial industry players and regulatory bodies.

This paper is structured as follows. Section 2 describes the data and details the scope of our studies. Section 3 introduces the methodology and assumptions developed for analyses of P&L volatility. Section 4 presents empirical results. Section 5 provides discussions and illustrations of the implications of the obtained results, and Section 6 offers concluding remarks.

2. Empirical Data and Scope

Being rather interested in aggregate interest rate hedge techniques at a portfolio level and not focusing on a cherry-picking performance of certain selected assets, we opt to study P&L sensitivity of model EM bond portfolios based on yield indices describing EM corporate debt performance. After careful studies of existing indices our choice was to use two J.P. Morgan Corporate Emerging Market Bond Indices: the Broad High Grade Blended Yield (Bloomberg ticker JBBYIGIG) and the Broad High Yield Blended Yield (Bloomberg ticker JBBYNOIG). As one could infer from the tickers´ abbreviations, the former presents a blended yield for Investment Grade bonds while the latter offers a blended yield for Non-Investment Grade instruments.

The blended high yield emerging market corporate bond index (JBBYNOIG) is a rule based index engineered to measure speculative grade corporate bond performance of USD denominated fixed-rate corporate bonds of issuers in emerging markets as defined by J.P. Morgan. This index is calculated using quite a widespread universe of emerging market corporate debt. Over four hundred corporate bonds issued by over two hundred issuers from over forty emerging market countries are contributed to the blended yield index calculations. Similarly, the blended high grade emerging market corporate bond index (JBBYIGIG) is also a rule based index engineered to measure investment grade corporate bond performance of USD denominated fixed-rate corporate bonds of issuers in emerging markets. Its issue, issuer and geography coverage is similar to the one described above.

These two indexes JBBYIGIG and JBBYNOIG provide more than 14-year long historical yield series, starting at December 31, 2001, which represent a considerable time interval for studying EM debt performance in the twenty first century. In our research the final date of analyzed data is put to be December 31, 2015. Of course for analyzing a dynamics of capital gains in debt portfolios, the price index perhaps would be a better choice, but to the best of our knowledge no price indexes with similar issuer, geography and historic coverage are available in the market. Thus, instead of researching an individual bond price histories and/or developing a range of bond price indexes from a selected universe of individual bond data we opt for using the two above mentioned yield indexes to measure high grade and high yield EM corporate debt performance.

As the main focus of our research is to analyze capital gains we rule out total return indexes as well, as the reinvestment of the net interest income proceeds does not enter the scope of the present research.

Being interested in a P&L dynamics of modeled portfolios hedged against interest rate risk, we model the basic interest rate risk hedge as a holding of short positions in US Treasuries with the five year maturity similar to the maturity of the above mentioned blended yield indexes. To describe the dynamics of the P&L of the interest rate risk hedge we employ the US Global Generic rate index available through the Bloomberg terminal under the USGG5YR ticker whose maturity is equivalent to the maturity of the two bond indices being analyzed.

The next section describes the methodology allowing for comprehensive analysis of EM corporate bond portfolios based on the time series of the broad blended yield indexes, along with our approach to tackle interest rate risk hedge based on shorting US Treasury bonds, relied on the US Global Generic rate historical series.

3. Methodology

The basis element of our index yield-based frame work is a conversion of the available value of a yield into the average price of the modeled portfolios, namely IG portfolio and or HY portfolio. We start our explanation with an example of just one bond. Considering a 5 year bond with annual coupon c and face value p, the price P of this bond could be written as

$$P = \frac{c}{1+y} + \frac{c}{(1+y)^2} + \frac{c}{(1+y)^3} + \frac{c}{(1+y)^4} + \frac{c+p}{(1+y)^5} \quad (1)$$

where y is a market interest rate for the level of riskiness associated with the bond under analyses. When the bond coupon c is equal to the yield y the bond is issued at par.

Now, when we have to deal with a blended yield index we do not have any actionable information on the subjacent bonds coupon values; we have just yield y. So, at this point one needs an assumption which would permit to overcome this lack of information in order to find an average price of a modeled portfolio.

So we employ an assumption of a “cruising speed” constant rate rebalancing of a portfolio. This assumption means that a bond entering the model portfolio stays in the portfolio for a certain holding period, say n years, and after the end of this period the bond is sold out. We assume that all bonds in the modeled portfolio represent equal weights. Fig. 1 schematically represents the rebalancing of the model portfolio consisting at any moment in time of six bonds with the identic face value.

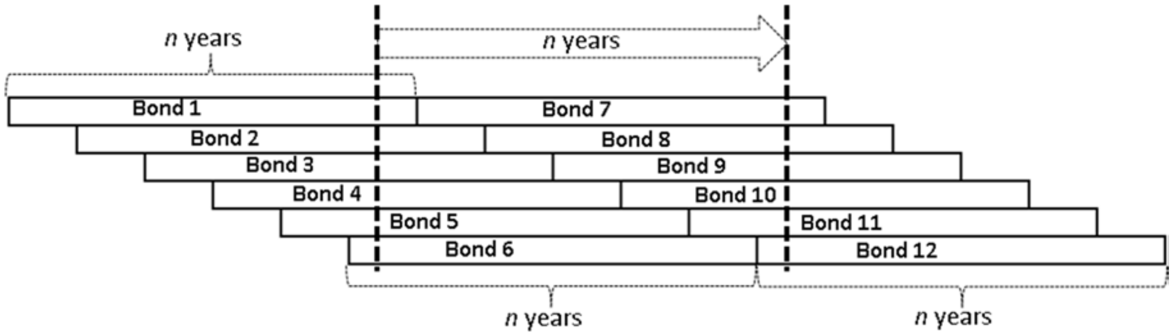

Figure 1. Schematic representation of a modeled portfolio rebalancing along *n* years

Any bond after an *n*-year long holding period is substituted by a newly issued on-the-run security. As the vast majority of bonds are issued at par, this gives us a key to finding an average coupon of the modeled portfolio at the date *d* as an average of the index yield daily values observed over the *n* years prior to this date *d*.

$$c = \frac{1}{n * 365} \sum_{i=1}^{n*365} y_i \tag{2}$$

During this study we employed three different holding periods *n* of 1, 2, and 3 years. The choice of this time intervals will be discussed in more detail further in the text.

Our research performs modeling of the two portfolios namely, EM IG and EM HY portfolios, as described by the JBBYIGIG and JBBYNOIG indexes, respectively. So now we are able to price each of these two model portfolios at any date covered by the employed JBBYIGIG and JBBYNOIG historical series. The more precisely is to say that for 1 year holding period the time window of reconstructed portfolio prices is 2003-2015, for 2 year holding period – 2004-2013, and for 3 year holding period – 2005-2015. The time intervals differ as in order to calculate the average coupon for a chosen portfolio the appropriate rebalancing speed must be chosen. In other words, the time extension of the averaging window is to be set equal to the length of the holding period.

The possibility to have historical price series for the two, IG and HY EM model portfolios enables us to quantify the capital gains (CG) related variations in the P&L of the modeled portfolios over any chosen period of time as the difference between portfolio prices subjacent to the two chosen dates:

$$\Delta_{P\_EM}(t, H) = P_{EM}(t + H) - P_{EM}(t) \tag{3}$$

where H stands for a time horizon over which the impact in price is analyzed.

The same approach is also applied for analyzing capital gains and losses of the short positions in US Treasuries performing the role of hedge instruments while the performance of the interest rate hedged EM portfolios is studied. So, for the long positions in US treasuries we have straight away:

$$\Delta_{P\_UST\_LONG}(t,H) = P_{UST\_LONG}(t+H) - P_{UST\_LONG}(t) \tag{4}$$

while dealing with the short positions we just invert the signs in the right hand side of the equation (4):

$$\Delta_{P\_UST\_SHORT}(t,H) = P_{UST_{LONG}}(t) - P_{UST\_LONG}(t+H) \tag{5}$$

Being interested in average capital gains over rather extended time intervals, as a metrics of portfolio performance from the point of view of capital gains we use an average impact in price over the available window of historic price deltas:

$$< \Delta_P(t,H) >= \underset{t}{Average}\, \Delta_P(t,H). \tag{6}$$

In this study we analyze a variety of the rebalancing rates, i.e., bond holding periods, being combined with the several lengths of time horizons over which the average capital gains and losses of the modeled portfolios are analyzed. Table 1 below presents our selection:

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes
1Y	*1Y*	*2003-2015*	*2004-2015*
2Y	*1Y*	*2004-2015*	*2005-2015*
2Y	*2Y*	*2004-2015*	*2006-2015*
3Y	*1Y*	*2005-2015*	*2006-2015*
3Y	*2Y*	*2005-2015*	*2007-2015*
3Y	*3Y*	*2005-2015*	*2008-2015*

Table 1. Available windows of price changes for diverse bond holding periods and portfolio impact horizons.

For the presented above available windows of price changes we analyze performance of the pure asset sides of the EM IG and HY portfolios, interest rate sensitivity of assets, the efficiency of hedge, downside risk exposures of hedged and unhedged portfolios as well as the respective upsides.

The downside risk of the portfolio we define as the most negative move in the price of the portfolio, being it hedged or unhedged

$$Downside = \min_t \Delta_P(t, H), \tag{7}$$

while the upside we define, just in the opposite manner, as a maximum gain over an analyzed period:

$$Upside = \max_t \Delta_P(t, H), \tag{8}$$

The meaning of all these metrics we will discuss in more detail in the next sections dedicated to the empiric results obtained by our approach and the discussion of their implications.

4. Empiric results

4.1. Visual and Correlation analyses of the two EM corporate bond indices.

Figures 2 and 3 present the historical series of the yields as per JBBYIGIG and JBBYNOIG indexes, respectively. For the sake of visual comparison and spread visualization these series are plotted along with the US Global Generic rate as per USGG5YR index

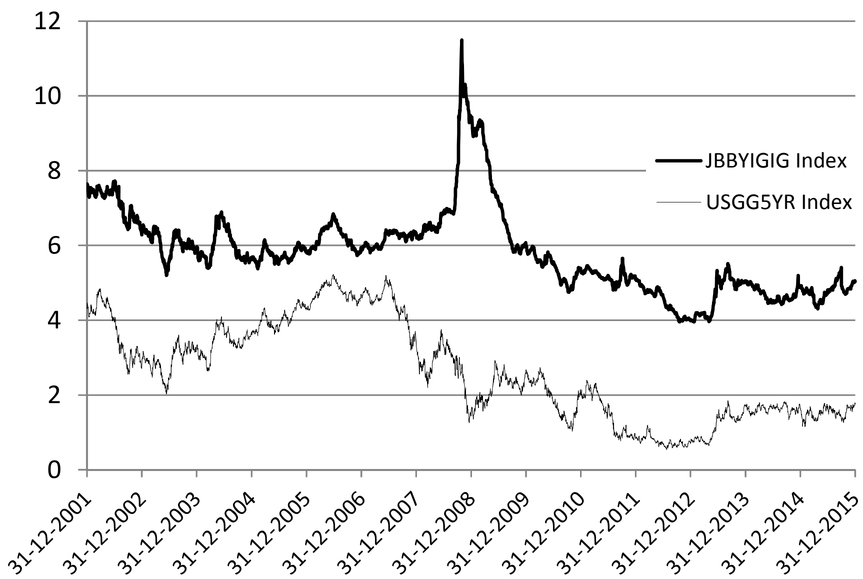

Figure 2. Blended bond yield of EM IG corporates vs. US Global Generic rate.
Source: Bloomberg

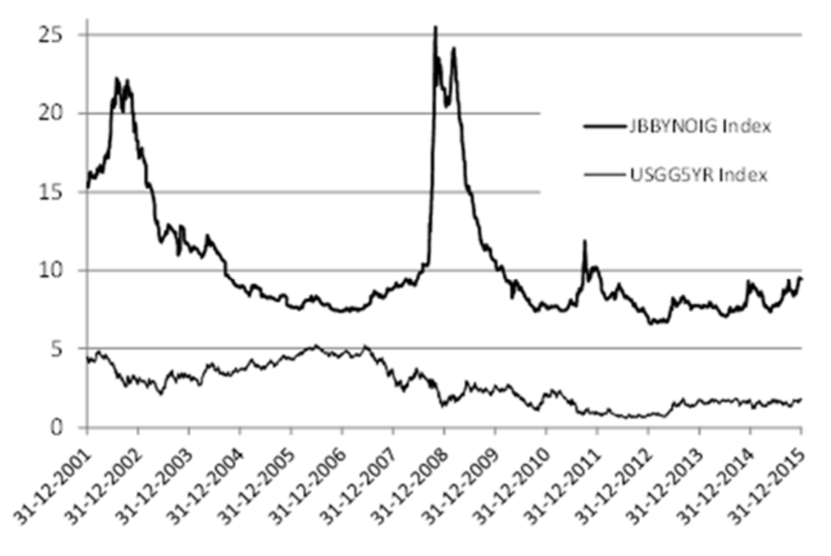

Figure 3. Blended bond yield of EM HY corporates vs. US Global Generic rate.
Source: Bloomberg

Both charts depicts a substantial widening of IG and HY bond spreads over risk-free rates in 2008 and 2009 corresponding to the gigantic flight-to-quality effect coinciding with the apogee of the global financial crisis. After the crisis the yields of risky and risk-free assets visually appear to move on parallel courses, creating a visual impression that during the six recent years the short position in UST would be a good hedge for EM portfolios. As we show later on, the problem here is that even under such circumstances the hedge efficiency is rather questionable, as what counts at the end is price changes of the risky and risk-free securities over the time horizon chosen to evaluate an impact in the portfolios´ P&L.

But prior to the analysis of capital gains and losses, we would also to present a correlation study. Fig.4 and Fig.5 depict a behavior of Pearson coefficient for 120 days long arrays of movements in the yields of risky and risk-free assets.

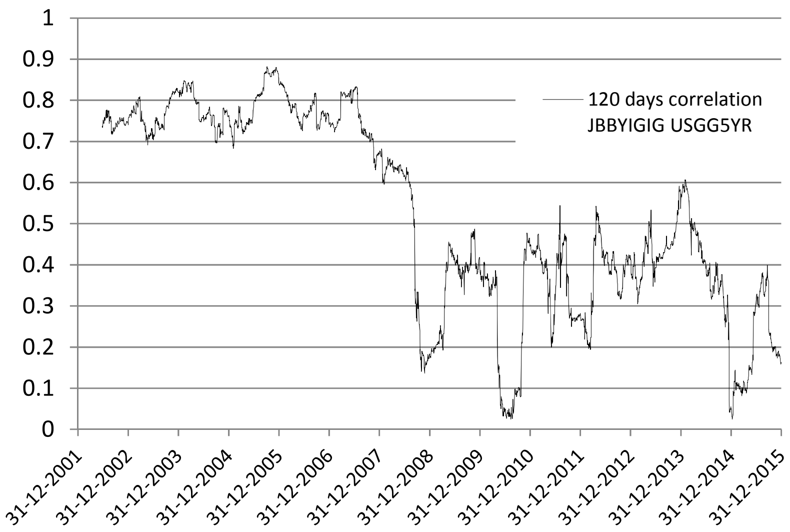

Figure 4. Correlation between yields of EM IG bonds and US Global Generic rates.

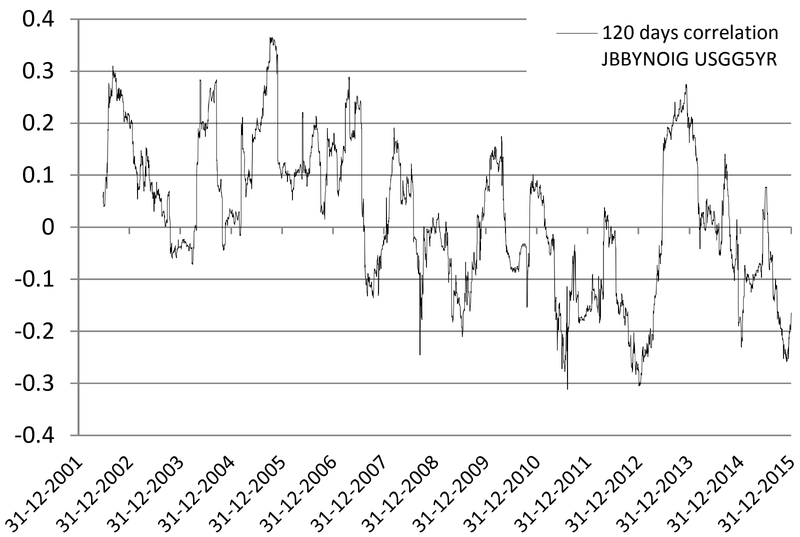

Figure 5. Correlation between yields of EM HY bonds and US Global Generic rates.

A visual comparative analysis of this two charts permits to conclude that moves in the yields of EM IG bonds are significantly more correlated t the moves in the rates of the risk-free assets than the yields of EM HY bonds. At least, the correlation coefficient for EM IG bonds never exhibits negative values, while the correlation coefficient for EM HY bonds almost half of the time stays in the negative territory, the evidencing contrarian behavior of the yields of speculative grade securities in respect to the UST yields. Mean values of 0,526 and 0,021 for the IG and HY bonds, respectively, averaged over the available data history also corroborate with stated above. The average value of the correlation coefficient for EM HY bonds very closed to zero certifies a practically full absence of correlations between the yields of HY EM corporates and the UST.

We do consider this correlation analysis impactful and convincing in the sense of analyzing the yield behavior, but we undertake the more advanced studies by quantifying the impacts of the yield dynamics on the capital gains and losses of model portfolios occurred over diverse time horizons under several assumptions regarding the rebalancing or renewal speed of the portfolios. For that reason, we use the yield data to recalculate price histories for the selected portfolios composed of IG and HY EM corporate securities.

4.2. Modeled portfolio prices

In this subsection we present our calculations of the historic prices for the model portfolios under the selected assumptions regarding the time interval along which the modeled portfolio is completely renewed, namely of 1, 2, and 3 years. We consider the face value of the portfolio to be equal to 1000 million USD. Fig. 6 represents the price dynamics of the 3 EM IG bond portfolios with the respective bond holding periods equal to the discussed above time intervals.

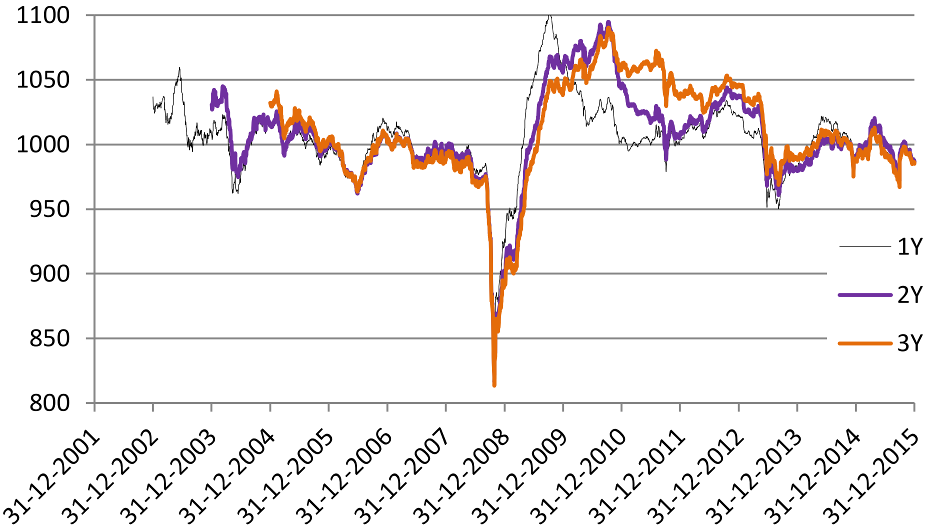

Figure 6. Prices of the EM IG bond portfolios with different bond holding periods.

As it appears from the comparative analysis of the price plots the price behaviors appears to be quite similar prior to the apogee of the global financial crisis at the end of 2008 and during the last three years. Still during the recovery phase one could observe major differences in the price behaviors. For the portfolio undergoing a complete renewal along 1 year rebalancing period the price bottom is not so deep as for the other portfolios while the major upside in prices occurs within 1Y after the bottom is reached. For the portfolios with the bond holding periods of 2 and 3 years the recovery spikes are not so sharp occurring over the respective 2 to 3 year long periods.

Fig. 7 represents the price dynamics of the 3 EM HY bond portfolios with the bond holding periods equal to 1, 2, and 3 years.

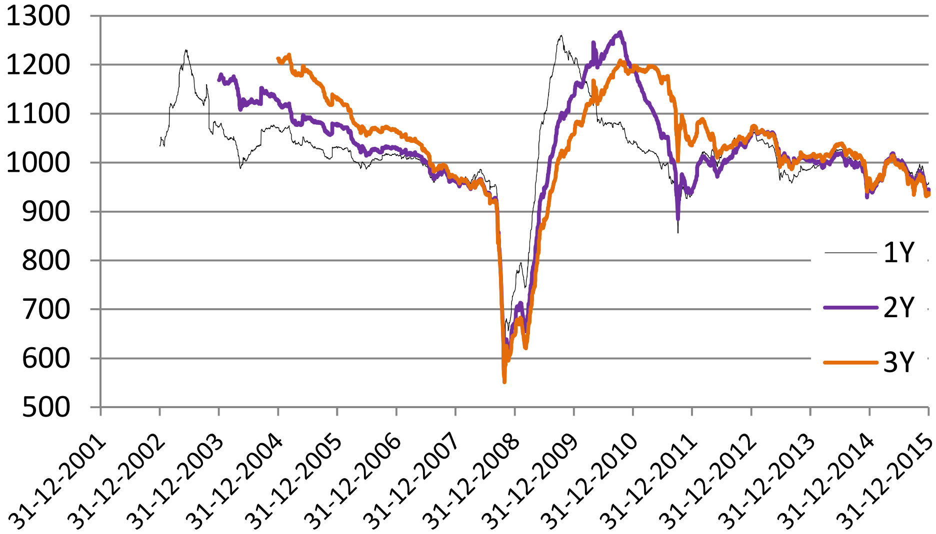

Figure 7. Prices of the EM HY bond portfolios with different bond holding periods.

These plots of the HY bond portfolio prices corroborate with our conclusions regarding the price recovery dynamics as a function of the bond holding period which we obtained from the analysis of the Fig. 5 depicting prices of IG bond portfolios over the same period. It is worth noting that as expected we observe that the financial crisis influence on HY portfolio P&L dynamics is stronger than on the price behavior of the IG portfolios.

Fig. 8 represents the price dynamics of the 3 UST long portfolios with the securities holding periods equal to 1, 2, and 3 years.

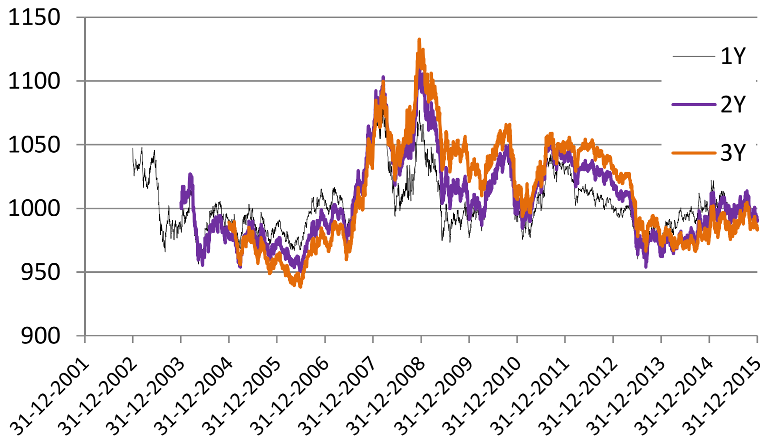

Figure 8. Prices of the UST long portfolios with different bond holding periods.

Comparing the price behavior of the risk-free UST portfolios and the risky EM portfolios one could conclude that the global financial crises represented a huge flight-to-quality event when the prices of safe assets increased and the EM bonds decreased. On the other hand the range of UST price changes (roughly -5%/+15%, see Fig.8) in narrower than the range of price changes both, for the IG EM corporate bonds (roughly -20%/+10%, see Fig.6) and HY EM corporate bonds (roughly -40%/+20%, see Fig.7).

4.3. Modeled historical series of capital gains and losses

In this section we study dynamics of the historic series of the annual, biannual, and triennial P&L impacts experienced by the EM and UST bond portfolios. The impacts are calculated on the daily basis. Based o this calculations we construct the history of capital gains and losses for the EM portfolios hedged by the short positions in the US Treasuries. The time spans of the series are limited due to the availability of data and depend on the rebalancing speed selected for the portfolio modeling as well as on the time horizon of the studied impacts.

4.3.1. EM IG corporate bond portfolios

Figure 9 represents the time behavior of the 1-year changes in value of the model EM IG corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 1 year.

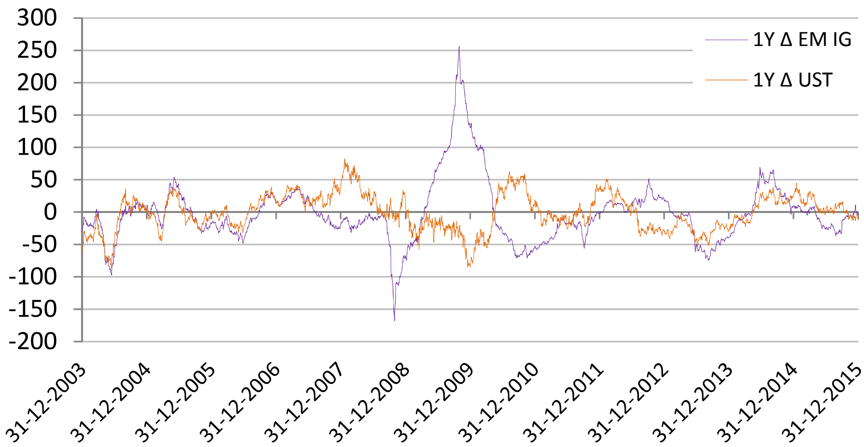

Figure 9. 1-year P&L of the EM IG and UST portfolios with 1 year bond holding period.

How to read this chart? The points plotted for December 31, 2003, represent changes in the values of the portfolios occurred over the 1 year started December 31, 2002. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2007 – 2012, the changes in the portfolio values are in an opposite mode.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 1-year long horizon to measure portfolio results and 1-year stay of the bonds in the portfolio, – the hedging of the EM IG portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 10 shows the time behavior of the 1-year changes in value of the model EM IG corporate bond portfolio hedged by the short positions in UST bonds, under the assumption of the complete portfolio rebalancing over 1-year time interval.

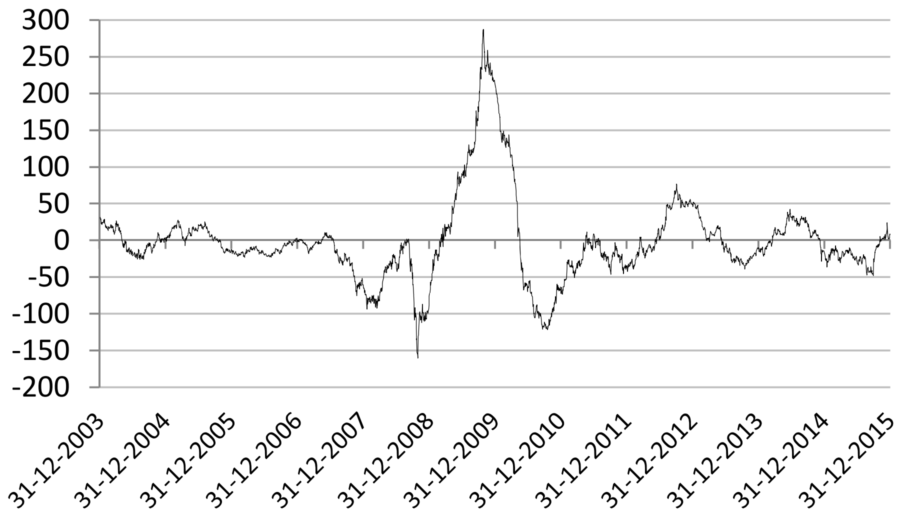

Figure 10. 1-year P&L of the EM IG long + UST short portfolio rebalancing over 1 year

As we could see by comparing Figures 9 and 10, the volatility, i.e., the width of the range, of 1-year returns of the EM IG bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Figure 11 represents the time behavior of the 2-year changes in value of the model EM IG corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 2 years.

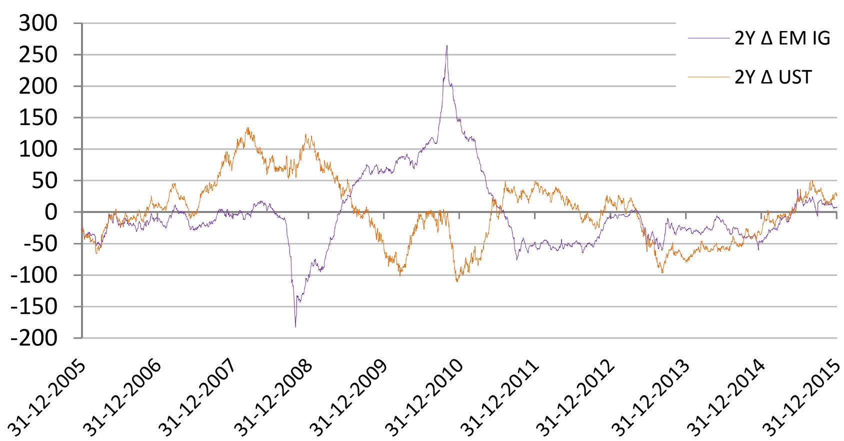

Figure 11. 2-year P&L of the EM IG and UST portfolios with 2 year bond holding period.

The chart above starts with the points plotted for December 31, 2005, which represent changes in the values of the portfolios occurred over the 2 years started December 31, 2003. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2006 – 2012, the changes in the portfolio values are in an opposite mode.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 2-year long horizon to measure portfolio results and 2-year stay of the bonds in the portfolio, – the hedging of the EM IG portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 12 shows the time behavior of the 2-year changes in value of the model EM IG corporate bond portfolio hedged by the short positions in UST bonds under the assumption of the complete portfolio rebalancing over 2-year time interval.

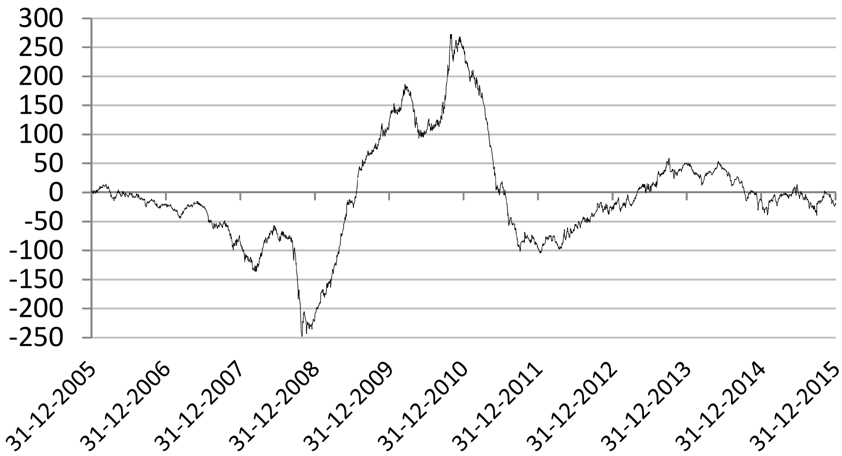

Figure 12. 2-year P&L of the EM IG long + UST short portfolio rebalancing over 2 years

As we could see by comparing Figures 11 and 12, the volatility, i.e., the width of the range, of 2-year returns of the EM IG bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Figure 13 represents the time behavior of the 3-year changes in value of the model EM IG corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 3 years.

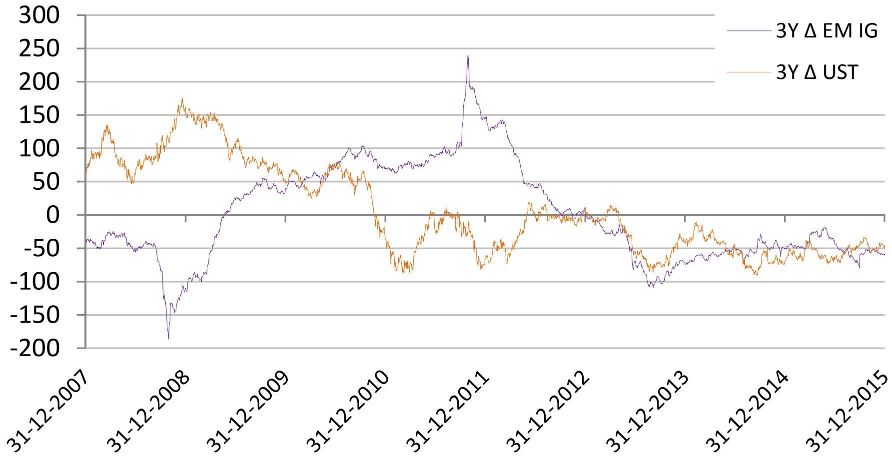

Figure 13. 3-year P&L of the EM IG and UST portfolios with 3 year bond holding period.

The chart above starts with the points plotted for December 31, 2007, which represent changes in the values of the portfolios occurred over the 3 years started December 31, 2004. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2007 – 2012, the changes in the portfolio values are in an opposite mode.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 3-year long horizon to measure portfolio results and 3-year stay of the bonds in the portfolio, – the hedging of the EM IG portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 14 shows the time behavior of the 3-year changes in value of the model EM IG corporate bond portfolio hedged by the short positions in UST bonds under the assumption of the complete portfolio rebalancing over 3-year time interval.

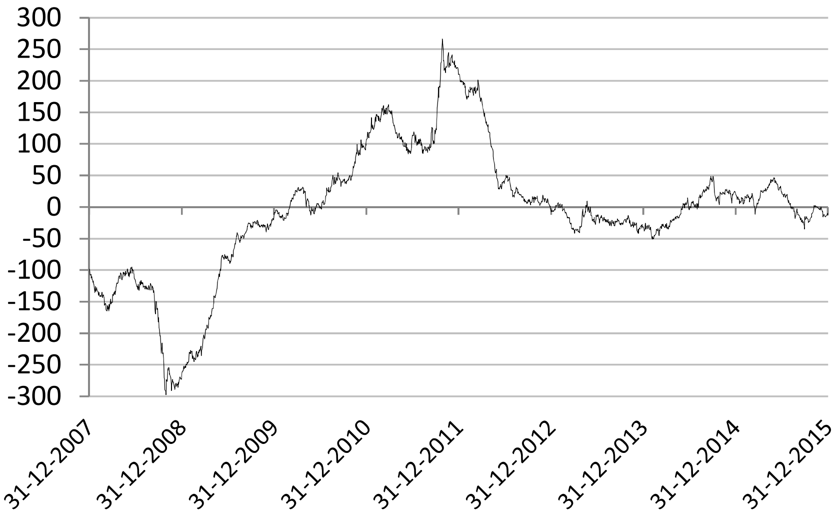

Figure 14. 3-year P&L of the EM IG long + UST short portfolio rebalancing over 3 years

As we could see by comparing Figures 13 and 14, the volatility, i.e., the width of the range, of 3-year returns of the EM IG bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Table 2 provides the comparative analysis of upside and downside risk in the modeled EM IG portfolios of 1000 million USD, observed over the available P&L changes window as a function of the complete portfolio rebalancing period, i.e. the time each bond spent in the portfolio or the bond holding period, and of time horizon used to calculate the changes in P&L, i.e. capital gains and losses.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	EM IG max downside	UST short + EM IG max downside	EM IG max upside	UST short + EM IG max upside
1Y	*1Y*	*2003-2015*	*2004-2015*	-167.85	-160.46	256.24	287.26
2Y	*1Y*	*2004-2015*	*2005-2015*	-184.47	-209.07	245.20	283.22
2Y	*2Y*	*2004-2015*	*2006-2015*	-182.52	-248.31	264.64	272.48
3Y	*1Y*	*2005-2015*	*2006-2015*	-180.79	-230.29	228.31	254.94
3Y	*2Y*	*2005-2015*	*2007-2015*	-188.31	-278.39	267.66	288.34
3Y	*3Y*	*2005-2015*	*2008-2015*	-185.93	-297.64	239.38	266.04

Table 2. EM IG portfolios upsides and downsides for diverse bond holding periods and portfolio impact horizons

As could be seen from Table 2 the difference between the lowest and the highest P&L changes for the portfolios hedged with short UST positions is always superior to that for the unhedged portfolios. It means that, over the considered time windows, such hedge in fact does not hedge against the most extreme changes in IRR of the EM IG portfolios but rather leverage their IRR exposure. In more details the implications of these results will be addressed in the section dedicated to Discussions and Implications.

Table 3 provides the comparative analysis of the average performance of long EM IG portfolio, long UST portfolio and the hedged long EM IG short UST portfolio for several combinations of portfolio rebalancing rate and portfolio impact horizon interval.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	Average EM IG return, (%)	Average UST return, (%)	Average EM IG + short UST return, (%)
1Y	*1Y*	*2003-2015*	*2004-2015*	-0.21%	-0.06%	-0.15%
2Y	*1Y*	*2004-2015*	*2005-2015*	-0.13%	0.10%	-0.23%
2Y	*2Y*	*2004-2015*	*2006-2015*	-0.26%	0.15%	-0.41%
3Y	*1Y*	*2005-2015*	*2006-2015*	-0.23%	0.20%	-0.43%
3Y	*2Y*	*2005-2015*	*2007-2015*	-0.14%	0.42%	-0.55%
3Y	*3Y*	*2005-2015*	*2008-2015*	0.03%	0.57%	-0.54%

Table 3. Average returns of long EM IG, long UST, and hedged long EM IG short UST portfolios for diverse bond holding periods and portfolio impact horizons.

As could be seen from Table 3 for the average returns of EM IG portfolios, they are slightly negative for the windows of P&L changes starting in the pre-crisis years. For the last window 2008-2015 the average return becomes slightly positive as this P&L changes window predominantly covers the post-crisis recovery. The average returns of the UST portfolios are predominantly positive, reflecting the fact that the variations in interest rates are largely downward after since 2005 as could be seen in Figures 1 and 2. In its turn this also explains an inefficiency of IRR hedging by short positions in US Treasuries from the point the point of view of improving capital gains and/or diminishing capital losses.

4.3.2. EM HY corporate bond portfolios

Figure 15 represents the time behavior of the 1-year changes in value of the model EM HY corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 1 year.

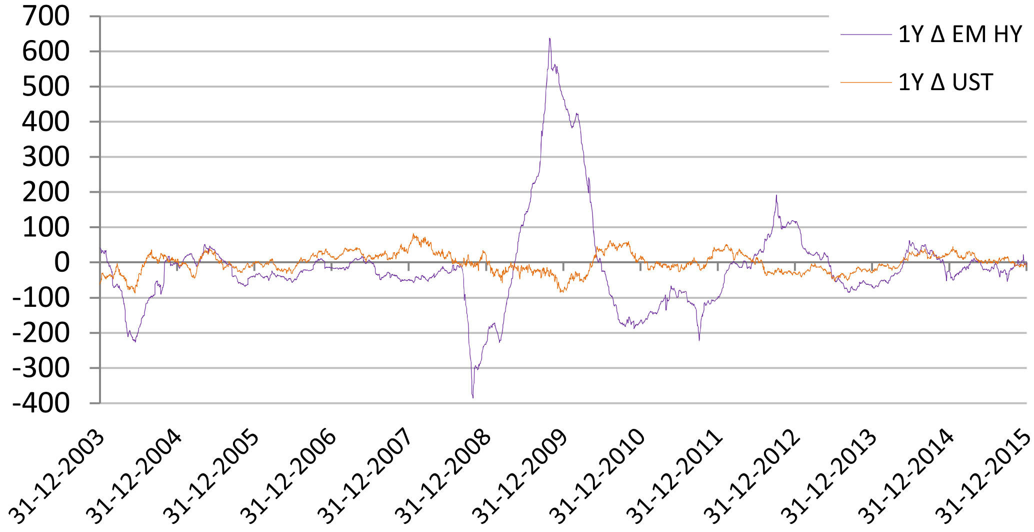

Figure 15. 1-year P&L of the EM HY and UST portfolios with 1 year bond holding period.

How to read this chart? The points plotted for December 31, 2003, represent changes in the values of the portfolios occurred over the 1 year started December 31, 2002. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2007 – 2012, the changes in the portfolio values are in an opposite mode. Note that the range of changes in EM HY portfolio price is several times wider than the range of changes in the value of risk-free UST portfolio.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 1-year long horizon to measure portfolio results and 1-year stay of the bonds in the portfolio, – the hedging of the EM HY portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 16 shows the time behavior of the 1-year changes in value of the model EM HY corporate bond portfolio hedged by the short positions in UST bonds, under the assumption of the complete portfolio rebalancing over 1-year time interval.

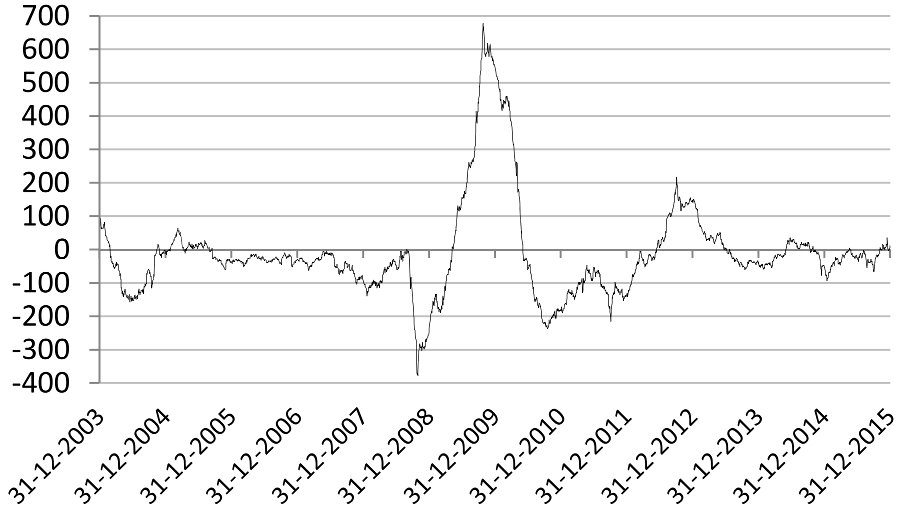

Figure 16. 1-year P&L of the EM HY long + UST short portfolio rebalancing over 1 year

As we could see by comparing Figures 15 and 16, the volatility, i.e., the width of the range, of 1-year returns of the EM HY bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Figure 17 represents the time behavior of the 2-year changes in value of the model EM HY corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 2 years.

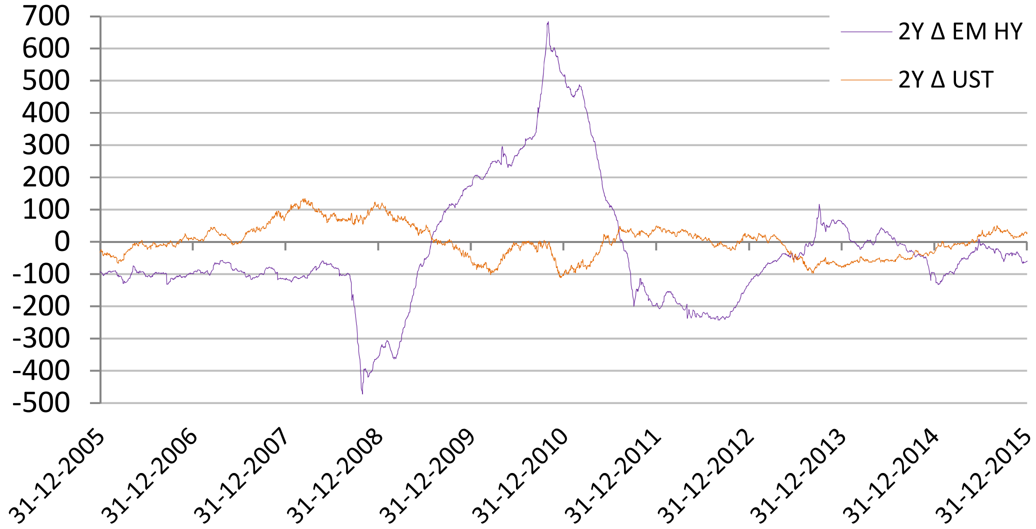

Figure 17. 2-year P&L of the EM HY and UST portfolios with 2 year bond holding period.

The chart above starts with the points plotted for December 31, 2005, which represent changes in the values of the portfolios occurred over the 2 years started December 31, 2003. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2006 – 2013, the changes in the portfolio values are in an opposite mode.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 2-year long horizon to measure portfolio results and 2-year stay of the bonds in the portfolio, – the hedging of the EM HY portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 18 shows the time behavior of the 2-year changes in value of the model EM HY corporate bond portfolio hedged by the short positions in UST bonds under the assumption of the complete portfolio rebalancing over 2-year time interval.

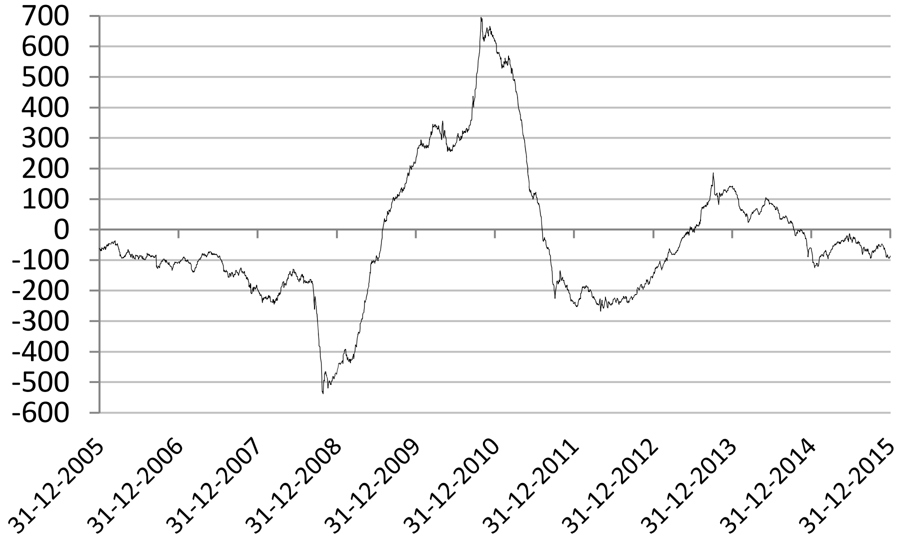

Figure 18. 2-year P&L of the EM HY long + UST short portfolio rebalancing over 2 years

As we could see by comparing Figures 17 and 18, the volatility, i.e., the width of the range, of 2-year returns of the EM HY bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Figure 19 represents the time behavior of the 3-year changes in value of the model EM HY corporate bond portfolio and in the risk-free UST bond portfolio, with the rebalancing rate of the portfolios equal to 3 years.

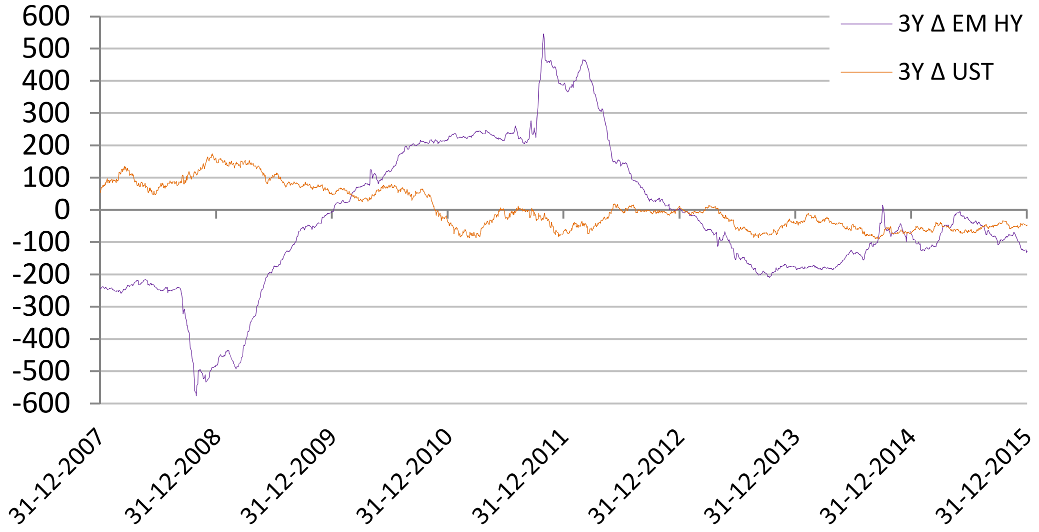

Figure 19. 3-year P&L of the EM HY and UST portfolios with 3 year bond holding period.

The chart above starts with the points plotted for December 31, 2007, which represent changes in the values of the portfolios occurred over the 3 years started December 31, 2004. One clearly observes that during the period prior and after the apogee of the global financial crises, in this case along 2007 – 2013, the changes in the portfolio values are in an opposite mode.

Hence, under the above mentioned assumptions regarding the portfolio strategy, i.e., 3-year long horizon to measure portfolio results and 3-year stay of the bonds in the portfolio, – the hedging of the EM HY portfolio with the short UST positions do not compensate the negative impacts, during the periods when such setoff is the most needed. Fig 20 shows the time behavior of the 3-year changes in value of the model EM HY corporate bond portfolio hedged by the short positions in UST bonds under the assumption of the complete portfolio rebalancing over 3-year time interval.

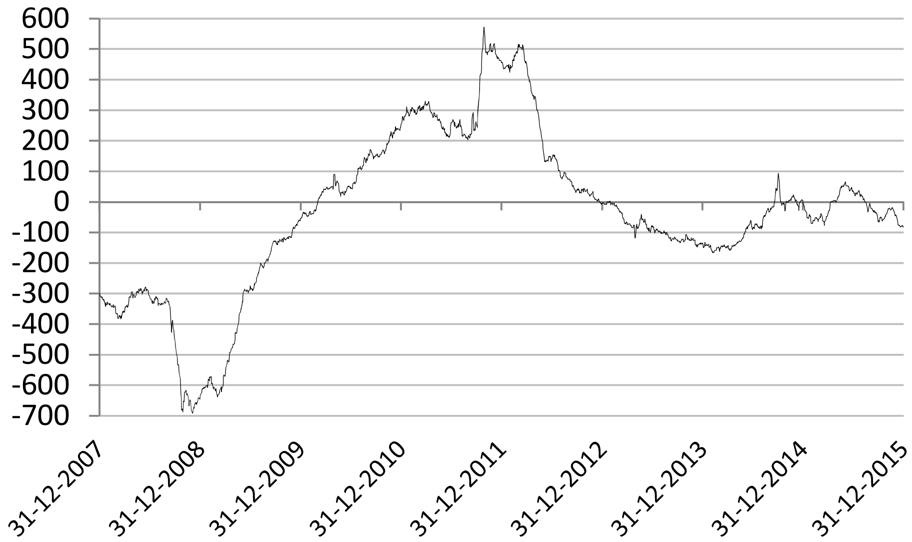

Figure 20. 3-year P&L of the EM HY long + UST short portfolio rebalancing over 3 years

As we could see by comparing Figures 19 and 20, the volatility, i.e., the width of the range, of 3-year returns of the EM HY bond portfolio hedged by short positions in the US Treasuries is superior to the P&L volatility of the non-hedged portfolio.

Table 4 provides the comparative analysis of upside and downside risk in the modeled EM HY portfolios of 1000 million USD, observed over the available P&L changes window as a function of the complete portfolio rebalancing period, i.e. the time each bond spent in the portfolio or the bond holding period, and of time horizon used to calculate the changes in P&L, i.e. capital gains and losses.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	EM HY max downside	UST short + EM HY max downside	EM HY max upside	UST short + EM HY max upside
1Y	*1Y*	*2003-2015*	*2004-2015*	-385.27	-377.88	637.58	677.71
2Y	*1Y*	*2004-2015*	*2005-2015*	-421.11	-445.59	529.87	602.50
2Y	*2Y*	*2004-2015*	*2006-2015*	-472.27	-538.06	683.39	695.76
3Y	*1Y*	*2005-2015*	*2006-2015*	-441.70	-491.20	485.97	559.59
3Y	*2Y*	*2005-2015*	*2007-2015*	-520.06	-610.99	648.14	664.14
3Y	*3Y*	*2005-2015*	*2008-2015*	-576.26	-691.85	546.30	572.96

Table 4. EM HY portfolios upsides and downsides for diverse bond holding periods and portfolio impact horizons

As could be seen from Table 4 the difference between the lowest and the highest P&L changes for the portfolios hedged with short UST positions is always superior to that for the unhedged portfolios. It means that, over the considered time windows, such hedge in fact does not hedge against the most extreme changes in IRR of the EM HY portfolios but rather leverage their IRR exposure In more details the implications of these results will be addressed in the section dedicated to Discussions and Implications.

Table 5 provides the comparative analysis of the average performance of long EM HY portfolio, long UST portfolio and the hedged long EM HY short UST portfolio for several combinations of portfolio rebalancing rate and portfolio impact horizon interval.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	Average EM HY return, (%)	Average UST return, (%)	Average EM HY + short UST return, (%)
1Y	*1Y*	*2003-2015*	*2004-2015*	-1.18%	-0.06%	-1.12%
2Y	*1Y*	*2004-2015*	*2005-2015*	-1.49%	0.10%	-1.59%
2Y	*2Y*	*2004-2015*	*2006-2015*	-2.53%	0.15%	-2.69%
3Y	*1Y*	*2005-2015*	*2006-2015*	-1.99%	0.20%	-2.19%
3Y	*2Y*	*2005-2015*	*2007-2015*	-2.95%	0.42%	-3.37%
3Y	*3Y*	*2005-2015*	*2008-2015*	-3.19%	0.57%	-3.76%

Table 5. Average returns of long EM HY, long UST, and hedged long EM HY short UST portfolios for diverse bond holding periods and portfolio impact horizons.

As could be seen from Table 5 for the average returns of EM HY portfolios, they are considerably negative for all the presented here windows of P&L, reflecting the fact that EM HY corporates bonds were affected more strongly by the global financial crisis that the EM IG corporates securities. As was mentioned while analyzing Table 3, the average returns of the UST portfolios are predominantly positive, reflecting the fact that the variations in interest rates are largely downward after since 2005, see Figures 1 and 2. In its turn this also explains an inefficiency of IRR hedging by short positions in US Treasuries from the point of view of improving capital gains and/or diminishing capital losses.

4.3.3. Comparing performance of EM IG and HY corporate bond portfolios

It is worth performing comparative analysis of the EM IG and EM HY portfolios. Table 6 presents ranges of P&L volatility, calculated as the highest upside minus the lowest downside in a portfolio performance observed along the available window of price changes, for both unhedged or hedged by UST short positions types of EM IG and HY portfolios.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	Unhedged EM IG P&L volatility range	Hedged EM IG P&L volatility range	Unhedged EM HY P&L volatility range	Hedged EM HY P&L volatility range
1Y	*1Y*	*2003-2015*	*2004-2015*	424.09	447.72	1022.85	1055.59
2Y	*1Y*	*2004-2015*	*2005-2015*	429.67	492.29	950.99	1048.09
2Y	*2Y*	*2004-2015*	*2006-2015*	447.16	520.78	1155.66	1233.81
3Y	*1Y*	*2005-2015*	*2006-2015*	409.10	485.23	927.67	1050.79
3Y	*2Y*	*2005-2015*	*2007-2015*	455.97	566.73	1168.19	1275.14
3Y	*3Y*	*2005-2015*	*2008-2015*	425.31	563.68	1122.55	1264.80

Table 6. P&L volatility ranges for EM IG and EM HY portfolios for diverse bond holding periods and portfolio impact horizons.

We clearly observe that the P&L volatility ranges for EM IG portfolios are more than two times narrower than those for EM HY portfolios. Thus, for the case of EM, our results explicitly attest that the returns of HY portfolios are much more volatile than the returns of IG ones.

Table 7 below summarizes statistics for the average returns of the unhedged EM IG, EM HY, and UST portfolios for diverse bond holding periods and portfolio impact horizons. The last two columns on the right hand side of the table present the average returns of EM IG and EM HY portfolios, respectively, being both hedged by short positions in US treasuries.

Bond Holding Period	Portfolio Impact Horizon	Available price history window	Available window of price changes	Average EM IG return, (%)	Average EM HY return, (%)	Average UST return, (%)	Average EM IG + short UST return, (%)	Average EM HY + short UST return, (%)
1Y	*1Y*	*2003-2015*	*2004-2015*	-0.21%	-1.18%	-0.06%	-0.15%	-1.12%
2Y	*1Y*	*2004-2015*	*2005-2015*	-0.13%	-1.49%	0.10%	-0.23%	-1.59%
2Y	*2Y*	*2004-2015*	*2006-2015*	-0.26%	-2.53%	0.15%	-0.41%	-2.69%
3Y	*1Y*	*2005-2015*	*2006-2015*	-0.23%	-1.99%	0.20%	-0.43%	-2.19%
3Y	*2Y*	*2005-2015*	*2007-2015*	-0.14%	-2.95%	0.42%	-0.55%	-3.37%
3Y	*3Y*	*2005-2015*	*2008-2015*	0.03%	-3.19%	0.57%	-0.54%	-3.76%

Table 7. Average returns of EM IG, EM HY, and UST portfolios for diverse bond holding periods and portfolio impact horizons.

For the EM HY portfolios the average returns for the observed windows of price changes are considerably lower than the average returns for EM IG portfolios. It is somewhat expected result as the EM HY corporate bonds were supposed to be much more affected by the global financial crisis than the IM IG corporates. Still it is important to note, that the presented in Table 7 returns do not incorporate a part of net interest income (NII) pocketed along the available windows of price changes. As could be seen from Figures 2 and 3 the yields of EM IG and EM HY portfolios are always above 4% and 7%, respectively. Hence, the overall average results of holding EM portfolios during the analyzed periods are positive. This is consistent with conclusions from the trends of diverse total return indexes through the time intervals under considerations; see for example J.P. Morgan EMBI Global Composite (Bloomberg ticker JPEGCOMP). Nevertheless, as we are focused at interest rate sensitivity of assets in a sense of impacts on the present value of principal, we opt to leave NII considerations and total return considerations out of the scope of our analysis.

5. Discussions and implications

5.1. Binary behavior of P&L-wise interest rate sensitivity of EM bond portfolios

Our results show overall negative relation between changes in price of EM corporate bond portfolios and UST risk-free securities portfolios. Our research is a pioneering study of a kind in a sense that to the best of our knowledge we are unaware of any other study focused on interest rate sensitivity of assets in terms of P&L changes. Conceptually, on average our results corroborate with the findings of Dupoyet B. et al (2016) which report consistent negative relation between credit spread and interest rates observed over the period 1973-2014. In a line with their findings, our results also evidence that, along the analyzed period 2001-2015, for EM corporate debt exposures the average negative relation between changes in price of EM corporate bond portfolios and UST risk-free securities portfolios holds for both investment-grade bond and high-yield bonds

Let us discuss now the difference in the asset sensitivity to interest rate as a function of the overall creditworthiness of assets. First, we studied a historic behavior of Pearson coefficient for 120 days long arrays of movements in the yields of risky and risk-free assets for both IG and HY bond portfolios, see Figure 4 and 5. We found that the mean values of Pearson coefficient for the IG and HY bonds, averaged over the available data history are 0,526 and 0,021, respectively. The average value of the correlation coefficient for EM HY bonds is much closed to zero and, hence, this number apparently certifies a practically full absence of correlations between the yields of HY EM corporates and the UST. Nevertheless this simplistic correlation approach and the presented figures do not really tell as the whole story, as more detailed analysis in terms of capital gains and losses clearly indicate the more complex nature of the interest rate sensitivity of assets.

On the other hand, investigating the asset sensitivity to interest rate from the point of view of capital gains and losses allows us to make more detailed and comprehensive conclusions. For example, analyzing Figure 9 one could observe two different regimes of P&L sensitivity of EM IG corporate bonds: let us say “normal” regime (2004-2006 and 2013-2015) and “distressed” regime (2007-2012). Under the “normal” regime, Figure 9 attests that the P&L moves of the portfolio of EM IG corporates represent positive correlation with the P&L moves of the portfolio consisting of UST securities, as the respective P&L lines move closely and jointly within the “normal” regime intervals. On the contrary, along the “distressed” regime interval the sensitivity sign changes from the positive to negative: the changes in the portfolio values of risk-free and risky assets behave in an opposite mode.

Another interesting feature to be observed is that under the “normal” regime the P&L changes of the EM IG portfolio are related to the P&L changes in the corresponding UST portfolio roughly as 1 to 1, i.e. are commensurable to each other. This situation changes dramatically if we are close to the apogee of the global financial crisis. Under the “distressed” regime, the P&L changes of the EM IG portfolio are related to the P&L changes in the corresponding UST portfolio roughly as -4 to 1, i.e., exposure to the interest rate risk is inverted and amplified.

The conceptual analysis of the two paragraphs above still hold for the P&L sensitivity to the interest rate of the EM HY corporate portfolios as could be inferred from Figure 15. But as HY securities are riskier than IG securities, the EM HY bond portfolio shows different degrees of interest rate sensitivity. Under the “normal” regime the P&L changes of the EM HY portfolio are related to the P&L changes in the corresponding UST portfolio roughly as 2 to 1, while under the “distressed” regime, the P&L changes of the EM HY portfolio are related to the P&L changes in the corresponding UST portfolio roughly as -8 to 1.

Thus, the absolute value of the sensitivity coefficient for HY bonds are superior to the sensitivity coefficient for IG bonds for both “normal” and “distressed” regimes. In respect to this outcome, we consider that our results corroborate to the findings of Dupoyet B. et al (2016) stating that HY bond credit spreads show more sensitivity to interest rates than IG bond credit spreads. But we call the attention that it is very important to relate the observed sensitivities to the general risk-on/risk-off regime of the markets, as it could influence the sign, i.e. direction, of sensitivities.

On the other hand, averaging sensitivities over a long run could disguise the observable effects as spanning the window of observations over both, the “normal” market regime with positive sensitivity and the “distressed” market regime with negative sensitivity, one could occasionally find himself observing on average only one of them, the predominant one, but damped by the other. Eventually, depending on the span of the window over the two regimes one even could observe insensitivity to interest rate, meaning that on average the sensitivity of one sign observed along certain intervals is damped to zero by the other sign sensitivity observed along the rest of the observation window. So it makes us doubt in a meaningfulness of the findings of Dupoyet B. et al (2016) which report consistent negative relation between credit spread and interest rates observed over the period 1973-2014. Our research proves that it is not always the case, at least for the P&L changes of EM corporate portfolios along the years 2002-2015, and illustrates the peril of the long span averaging capable of hiding variation in sensitivities along the constituent short run intervals.

5.2. Interest rate sensitivity of EM bond portfolios in relation to phases of business cycles

Based on our analysis we proposed an explanation for both positive and negative P&L-wise interest rate sensitivities of the EM portfolios observed along changing economic conjuncture. Under the “normal” regime, the sensitivity of the P&L of the EM portfolios to changes in the P&L of the corresponding UST portfolio is positive. It means that the ups and downs in the risk-free interest rate are passed through, being augmented (HY bonds) or not (IG bonds), to the respective bond yields. For both, IG and HY EM portfolios, we posit that moderate and not abrupt increases and decreases in the risk-free interest rate do not affect the level of corporate creditworthiness if considered from the operations point of view. This is especially true for the IG portfolios, as under the “normal” regime the P&L changes of the EM IG portfolio are related to the P&L changes in the corresponding UST portfolio roughly as 1 to 1.

The fact that under the “normal” regime the P&L changes of the EM HY portfolio are related to the P&L changes in the corresponding UST portfolio roughly as 2 to 1, we attribute to the presence, in HY securities, of the embedded leverage, which could be interpreted as a situation when the initially borrowed dollar is used in business operations to enable borrowing of one dollar more. For the observed EM HY portfolio based on our results we could estimate that the embedded leverage ratio is close to 2:1. Once again, the creditworthiness of EM HY bonds, if considered from the operations point of view, also seems not to be affected under the “normal” regime.

We ascribe such “normal” regime of interest rate sensitivity to periods of sustainable moderate growth, i.e., growth which is not stimulated by non-conventional policy measures and is not fueled by any apparent boom of bubble creation resulting in practices of “panic” buying and inflated prices of certain types of assets. Discussing geographically diversified EM portfolios we certainly refer to global economic growth. Still, we posit that our reasoning also holds for IG and HY assets in isolated geographies selected on a regional and/or country basis.

Let us discuss now the negative P&L-wise interest rate sensitivities of the EM portfolios observed under the “distressed” regime. We consider the “distressed” regime to span over the two consecutive phases: deterioration and recovery of economic conditions. In other words, in respect to the recent history, those phases are the crisis development and recuperation from the crisis low. We could also think of “distressed” regime as of a passage through a bust of a bubble to the economic bottom and then back to economy as usual.

During the vicious cycle of a recession, markets enter into the risk-off mode and the risk-free rate behavior exhibits a downtrend dynamics due to the increasing demand for the safe assets. Additionally, central banks in a recession adopt a policy of reducing interest rates in order to stimulate the investment necessary to turn things around. In parallel, the worsening of economy augments the credit risk of the corporates through several mechanisms. From an operations point of view, business conditions in recession get worse due to the lower demand for product and services as uncertainty increases. Regarding the financial side of businesses, the deteriorating economic conditions make it difficult for companies to obtain external investment. Financing costs keep growing. The increase in default risk, provoked by the above mentioned factors, results in the widening of credit spreads for corporate bonds. Consequently, following our reasoning one could conclude that when interest rates are decreasing, the credit premia are rising, i.e., the credit spreads are widening. That is nothing but a well-known flight-to-quality phenomenon described through the prism of economic environment.

During the recovery from a flight-to-quality, i.e., during a “flight-from-quality”, markets enter into the risk-on mode. In such periods of economic expansion, the demand for the safe assets drops, causing the risk-free interest rate rise. Under such conditions central banks are potentially more likely to adhere to the tightening of monetary policy by increasing interest rates. As the economy recovers interest rate increases could even become necessary to avoid the overheating of the economy and keep inflation under control. Simultaneously, this economic recovery results in a decrease in the corporate default risk. From an operations point of view, corporations start to benefit from improved consumer confidence, augmented demand, and reduced uncertainty. Financing risk and costs also decrease. As a result, on average credit spreads of corporate bonds tighten. Once again, following our reasoning one could conclude that when risk-free interest rates are increasing, the credit premia are declining, i.e., the credit spreads are narrowing. That is nothing but a recovery from a well-known flight-to-quality phenomenon described through the prism of economic environment.

So, only for the “distressed” regime, to which we attribute pre-recession and post recession phase of business cycles, our research is in line with results of Dupoyet B. et al (2016), which state that the average change in interest rates (credit spreads) is negative (positive) during periods of recession while the average change in interest rates (credit spreads) is positive (negative) during periods of economic expansion. But for us the periods of economic expansion referred in the cited research seems to be rather the periods of recovery from economic cycle lows. We evidence and state that the negative relations between interest rates and credit spreads disappear and turn to insensitive relations (for IG corporates) and positive relations (for HY corporates) under the “normal” regime which we ascribed to the period of moderate sustainable growth present in any business cycle after the recovery from the preceding recession but prior to boom and consecutive bust leading to the next downturn.

5.3. Additional Considerations

Our results also corroborate with the findings of Boulkeroua and Stark (2013), observing that interest rate sensitivities vary across ratings categories. In our case for the EM HY portfolios we observe more pronounced sensitivities both, positive (under “normal” regime) and negative (under “distressed” regime) than for the EM IG portfolios.

So now we need to address the question we tried to answer. At the end, does it make an economic sense to hedge interest risk of U.S. dollar denominated EM corporate debt by short positions in U.S. Treasury bonds or by pay-fixed receive-float interest rate swaps? As we have evidenced by our results, such hedge makes sense only over the periods of moderate sustainable growth. On the contrary, to hedge against downside risk in times of economic turmoil, as suggested by our findings, it is advisable to augment exposure to IRR, for example by contracting pay-float receive fixed IRS. In sum, we argue that the hedging of IRR and downside risk should not be mechanical, but ought to be a dynamic process linked to phases of business cycles.

Conclusion

In this research, we develop the proprietary framework to assess an interest rate sensitivity of corporate bonds portfolio based on yield indexes. We apply our model approach to two types of EM corporate debt: IG and HY securities. Our research advances well beyond the correlation analyses and even beyond the widely performed studies of the relation between interest rates and credit spreads as we investigated the bottom line profit and loses of different model portfolios.

We do consider our framework has a huge potential. Our results are more convincing in a sense that in fact the relation between spreads and interest rate could serve only as guidance toward what it would look like the bottom line of the real portfolios, while our approach is focused on P&L of the portfolios, i.e., on what matters at the very end, or what impacts are to expect at the final instance. Hence, it offers important insides on a practical side of a downside risk hedging.

The historical span of our research covers the period 2002-2015, which enables us to assess interest rate sensitivity of assets during the development, apogee, and aftermath of the recent global financial and economic crisis. The results presented in this paper contrast with the result of previous empirical work and their theoretical interpretations.

We find empirical evidence of binary behavior of interest rate sensitivity along phases of business cycles. Under “normal” regime that we ascribe to the moderate sustainable growth period, the changes in P&L of EM portfolios the positively related to the changes in P&L of UST bond portfolios. On the other hand, under “distressed” regime that we ascribe to a phase spanned over an entry to and exit form a recession, the changes in P&L of EM portfolios the negatively related to the changes in P&L of UST bond portfolios. This suggests that the hedging of downside risk ought to be a dynamic process linked to phases of business cycles.

Examining behavior of asset sensitivity to interest rate along phases of business cycles we corroborate with our idea that an integrated treatment of the IRR and credit risk potentially allows for optimizing ECAP of banks and financial institutions. This research represents a contribution to the advancement of the discussion on the EM cross-geographies alignment of the Pillar 2 methodologies under Basel III capital accord.

Looking ahead, we can affirm that the applicability of the developed herein index-based framework to gauge interest rate sensitivity is considerably wider than the corporate debt of EM. Depending on availability of yield indexes and price indexes, it can be applied to diverse portfolios containing fixed income assets from diverse geographies, sectors and security rating categories. Thus, further research in this field is highly desirable for positively impacting overall efficiency of financial system. It potentially allows financial institutions to improve their risk assessment and ECAP management.

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