BBVA Research

Methodological annex
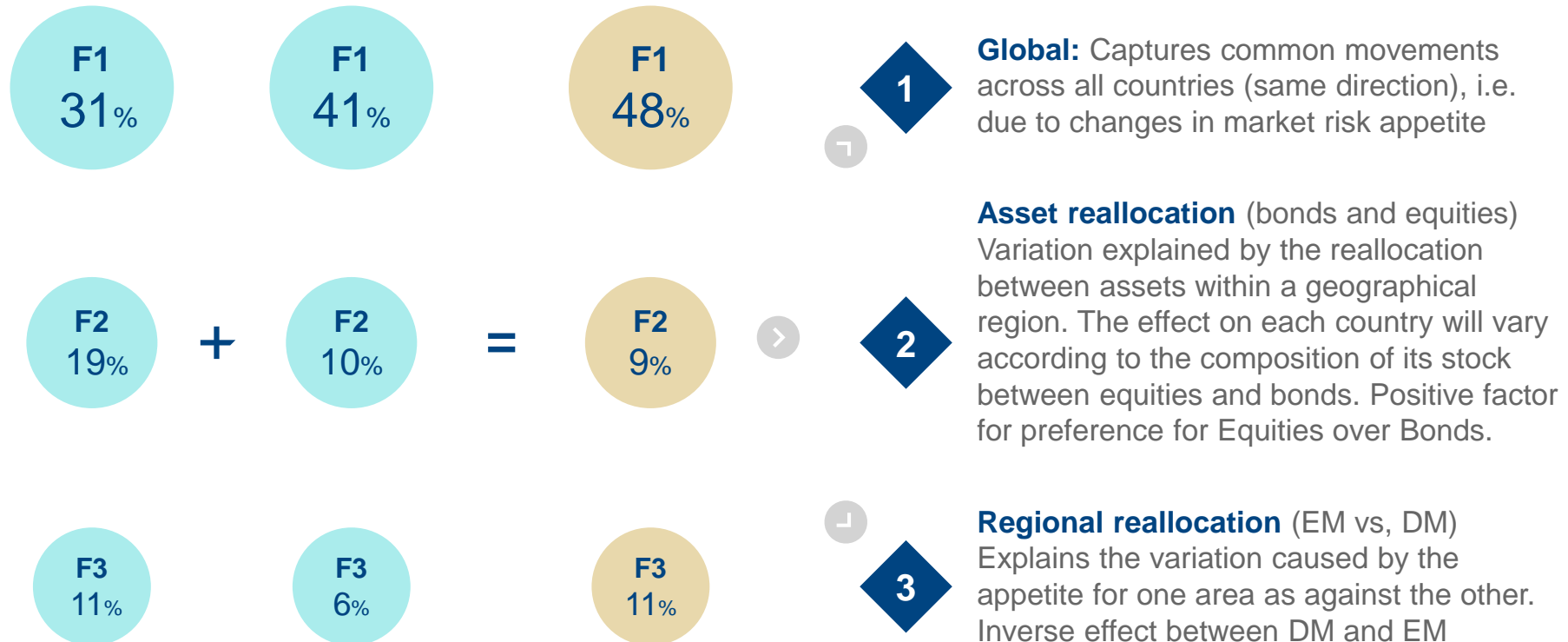
November 2018

Factor analysis of EPFR flows, decomposition of global and idiosyncratic factors

% of 42 EQ
flows explained

% of 42 BN
flows explained

Implicity, **% of 42 Total**
flows explained

GIF flows could be explained by 3 identified factors and idiosyncratic differences

F1
31%

F1
41%

F1
48%

1 **Global:** Captures common movements across all countries (same direction), i.e. due to changes in market risk appetite

F2
19%
+
F2
10%
=
F2
9%

2 **Asset reallocation** (bonds and equities) Variation explained by the reallocation between assets within a geographical region. The effect on each country will vary according to the composition of its stock between equities and bonds. Positive factor for preference for Equities over Bonds.

F3
11%

F3
6%

F3
11%

3 **Regional reallocation** (EM vs, DM) Explains the variation caused by the appetite for one area as against the other. Inverse effect between DM and EM

Macro-Financial Determinants of EPFR Flows

01 Methodology: GLS panel data

02 Sample: 42 countries, quarterly data from October 2005 to June 2017

03 Dependent Variables: Equities (EQ), Bonds (BN) and Total flows to each country.

04 We have allowed each explanatory variable to have a different effect on Developed vs. Emerging Markets

05 Explanatory variables (first differences)

- VIX
- USA 10Y-2Y Curve
- GDP Growth (EM, DM, Idios.)
- Inflation (EM, DM, Idios.)
- Short-term interest rate (EM, DM, Idios.)
- West Texas Intermediate (WTI)
- FED, ECB & BoJ Balance Sheet
- Expectation of changes in FED, ECB & BoJ Balance Sheet

- Public Debt-to-GDP
- Credit-to-GDP gap*
- Investment-to-GDP
- Savings-to-GDP
- Reserves-to-Imports

Macro-Financial Determinants of EPFR Flows.
Panel Regression Results (Coefficients)
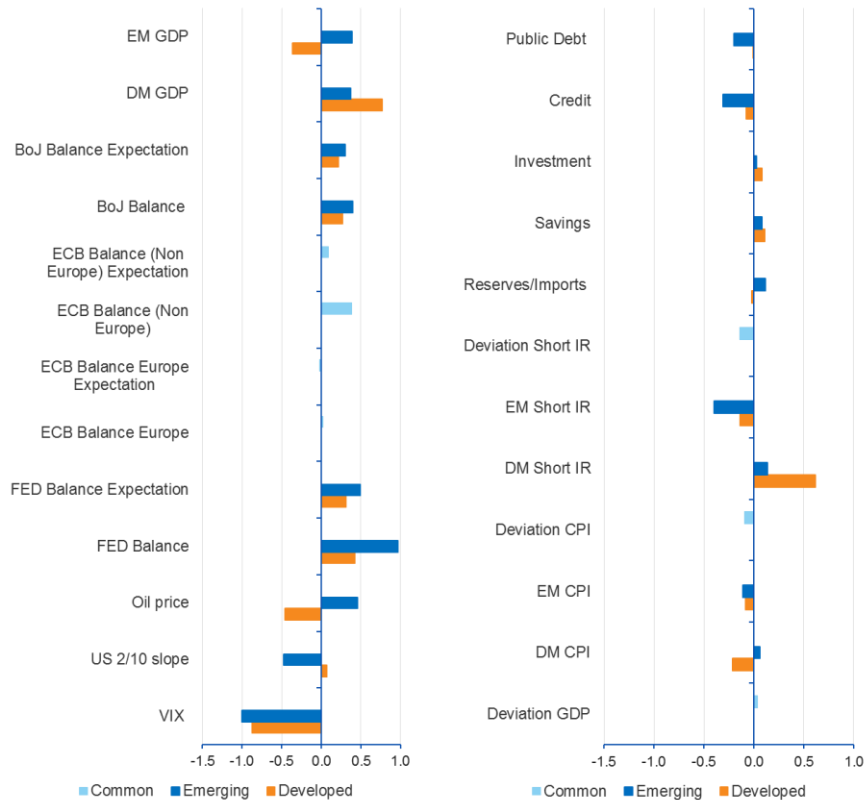
- Global variables are by far the most important determinants of total, equity & bond flows.

- Idiosyncratic variables play a limited role

- Markets seem to differentiate sharply between Emerging and Developed countries, but differentiation between countries seems quite limited
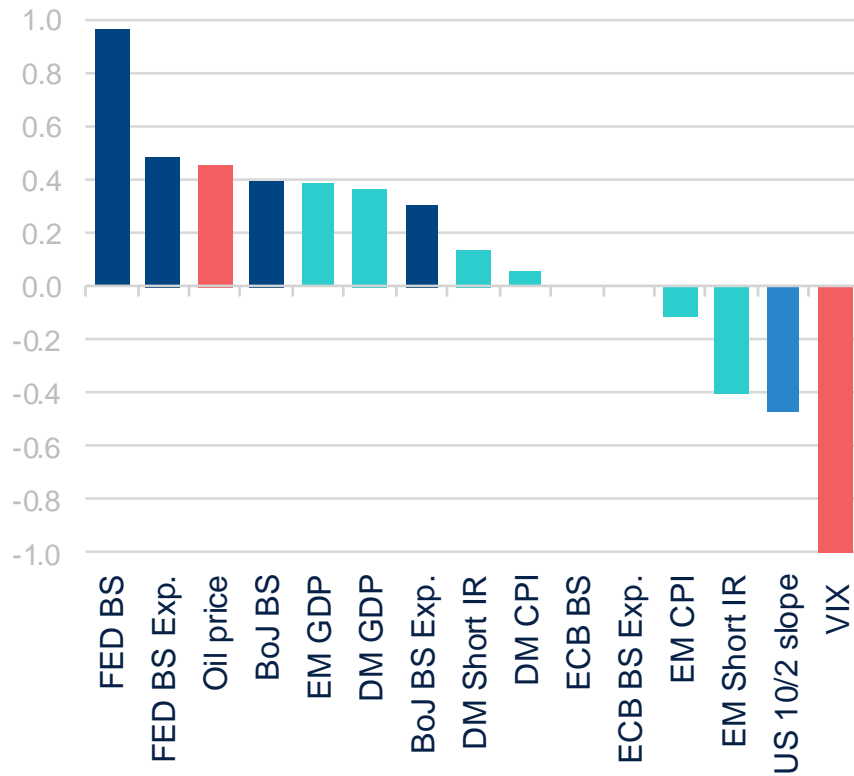
R^2 = 0.54

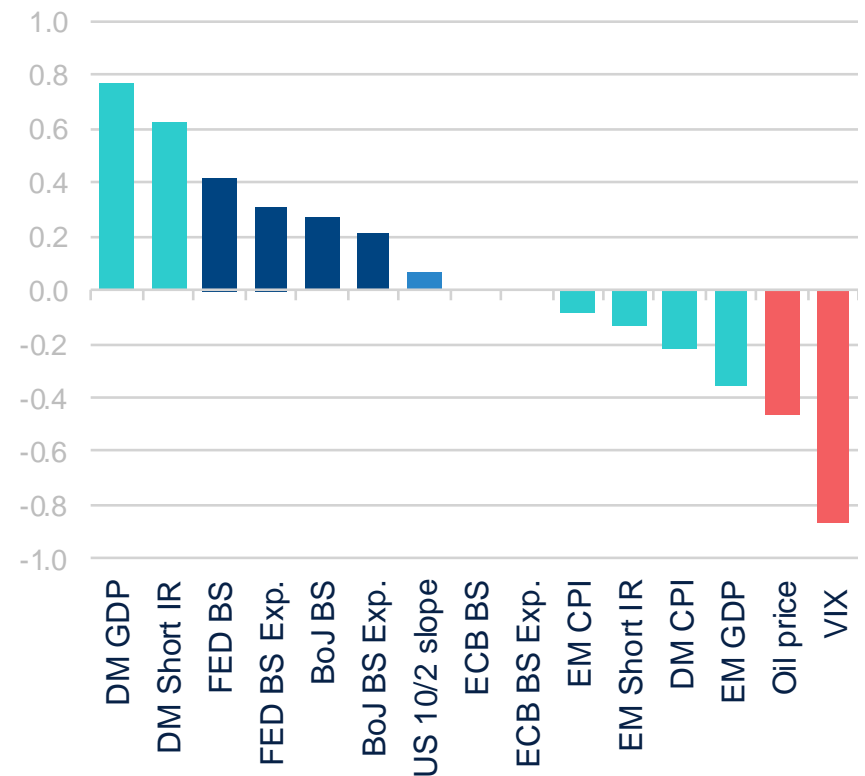(*) Coefficients of standardised variables.

Global variables

Sensitivity of EM GIF flows
(Coefficient of standardised variables in a panel regression)

Sensitivity of DM GIF flows
(Coefficient of standardised variables in a panel regression)

Source: BBVA Research, EPFR

Safe-haven indicator

The starting point for developing the indicator is to identify periods of risk aversion in financial markets. We determine these periods based on significant movements in selected financial variables. That is, we define a period t of risk aversion as follows:

$$t \text{ is a risk aversion period } \Leftrightarrow (\Delta T10 < 0 \text{ or } \Delta GER10 < 0 \,\&\, \Delta VIX > 0 \,\&\, \Delta EquityEM < 0)$$

Where:
- $\Delta T10$ refers to the weekly change of the 10Y Treasury

- YTM
- $\Delta GER10$ refers to the weekly change of the 10Y German government bond YTM
- ΔVIX refers to the weekly change of the VIX index
- $\Delta EquityEM$ refers to the weekly change of the MSCI Emerging Markets Index

In short, a risk aversion period is such that we witness lower long-term rates in developed market's government bonds, higher volatility in developed markets' equity and losses in emerging markets (EM) equity.

Once we have defined the set of risk aversion episodes, we categorize Safe Haven periods as a subset. To do so we follow two steps:

- First, we use the EPFR data to determine the conditional distribution of bond flows from institutional investors to Safe Haven countries (USA, Germany and Japan) and the conditional distribution of equity flows to Emerging Market countries (EM) from retail investors, both based on the four-week moving average change of assets under management (AUM). We are interested in the distributions in periods of risk aversion given their different behavior in comparison when considering the whole sample. In addition, we separate the distributions by type of investor given that we found a significant difference in their behavior under conditions of uncertainty (see figures 1, 2 and 3,4). That is, we found that institutional investors tend to fly to government bonds, while retail investors tend to reduce significantly their exposure to EM equity. These patterns could be associated with the different investment objectives and investment horizons of these types of investors

- Second, based on the analysis of the distributions by type of investor in risk aversion episodes we define the safe haven episodes as those periods t' such that

$$t' \text{ is a safe haven period } \Leftrightarrow (Bond \text{ } flows \text{ } to \text{ } haven \text{ } countries \text{ } from \text{ } Institutional \text{ } Investors > p50) \,\&\, (Equity \text{ } flows \text{ } to \text{ } EM \text{ } from \text{ } Retail \text{ } Investors < p50) \,|\, t' \varepsilon \text{ } risk \text{ } aversion \text{ } episode)$$

That is, given that we are in a risk aversion episode, this can be considered in the subset of Safe Haven episodes if and only if the flows from Institutional Investors to safe haven bonds during the period increases in more than the median of the distribution; and if bonds from retail investors to emerging market equity decrease during the period in more than the median of the distribution. All measured by the four-week moving average change of assets under management

A second subset of risk aversion episodes is given by the redemption category. This tries to capture all risk aversion episodes in which investors sell most financial assets looking not just for save haven but for liquidity. In short, we define redemption episodes as follows:

$$t'' \text{ is a redemption } \Leftrightarrow Bond \text{ } flows < 0 \,\&\, Equity \text{ } flows < 0 \,\&\, Money \text{ } market \text{ } flows > 0 \,|\, t'' \varepsilon \text{ } risk \text{ } aversion \text{ } episode$$

That is, given that we are in a risk aversion episode, this can be considered in the subset of redemption episodes if and only if two conditions hold:
1) The flows to bonds and equity during the period decrease;
2) The flows to money markets increase;

All measured by the monthly average of assets under management

Regional re-allocation

This exercise pursues a simple indicator to measure the investor's preference for a certain region over time. It is based on EPFR data* The indicator has been built with the EPFR data (since 2005) in USD but the portfolio flows have been relativized by assets under management (of each period) to make their comparable.

The indicator allows us to capture the short term dynamics and to quantify and compare the effects in portfolio flows of the realization of some risk events in a very simple way. It lets us identify easily the regions that suffered the most and to measure the relative impact.

This is a relative indicator as it compares the flows to different regions to create relative measure.

The previous step is to create an indicator for EM and to DM. Those indices are obtained by smoothing (moving average 3M) the normalized flows to each region (weighted by asset under management of each country or area) in order to create a more stable indicator for each region given we aim to capture the trend more than the weekly spikes. As the flows have been standardized, those indices should be understood as standard deviation from their historical mean (since 2005). These partial indicators allow us to breakdown areas or countries' contribution to the indicator.

The difference between developed markets and emerging market indices shows the relative appetite of each region, and a deviation of 0.5 from the mean means a marked preference for one region over the other.

- Weekly change in total portfolio flows by Country (% of assets under management)

$$x_i = \frac{Weekly\ total\ flows\ (USD)}{Total\ assets\ under\ management\ (USD)}$$

- Standardization

$$Z_i = \frac{x_i - \bar{x}}{\sigma}$$

- Moving average of 3 months

$$\frac{1}{n}\sum_{i=0}^{n} Z_i$$

n: 12 weeks

- The moving average weighted by its relative weight in EPFR database

$$\bar{x}_{DM} = \frac{\sum_{i=1}^{n}(x_{DMi} * w_{DMi})}{\sum_{i=1}^{n} w_{DMi}} \qquad \bar{x}_{EM} = \frac{\sum_{i=1}^{n}(x_{EMi} * w_{EMi})}{\sum_{i=1}^{n} w_{EMi}}$$

W: is the weight of each country or area in the assets under management in each area (DM or EM)
X: is the 3-month moving average of the standardized flow to a country or region
i: is the countries or area in the regional (DM or EM) index

- Relative preference:

$$Y = \bar{x}_{EM} - \bar{x}_{DM}$$

Weight of each country in the region

Region	Country	Weight	
DM	United States	73%	100%
	Eurozone	13%	
	Japan	6%	
	United Kingdom	5%	
	Swizerland	3%	
EM	Latin America	31%	100%
	Asia (ex China & Japan)	51%	
	Emerging Europe	18%	

Type of asset re-allocation

This exercise pursues a simple indicator to measure the investor's preference for a certain type of assets (equity or bonds) over time. It is based on EPFR data* The indicator has been built with the EPFR data (since 2005) in USD but the portfolio flows have been relativized by assets under management (of each period) to make their comparable.

The indicator allows us to capture the short term dynamics and to quantify and compare the effects on portfolio flows of the realization of some risk events in a very simple way. It allows us to easily identify the type of assets that suffered the most and allows us to measure the relative impact.

This is a relative indicator as it compares the flows to different type of assets to create relative measure.

The previous step is to create an indicator for Bonds or Equity. Those indices are obtained by **smoothing** (moving average 3M) the normalized flows to each type of asset (weighted per asset under management of each country or area) in order to create a more stable indicator for each region given we aim to capture the trend more than the weekly spikes. As the flows have been standardized, those indices should be understood as standard deviation from their historical mean (since 2005).

The difference between bonds and equity shows the relative appetite of each type of asset, and a deviation of 0.5 from the mean means a marked preference for one type of assets over the other.

- Weekly change in Bonds and Equity portfolio flows by Country (% of assets under management)

$$x_i = \frac{Weekly\ total\ flows\ (USD)}{Total\ assets\ under\ management\ (USD)}$$

- Standardization

$$Z_i = \frac{x_i - \bar{x}}{\sigma}$$

- Moving average of 3 months

$$\frac{1}{n}\sum_{i=0}^{n} Z_i$$
n: 12 weeks

- The moving average weighted by its relative weight in EPFR database (example for DM)

$$\bar{x}_{DM\ bond} = \frac{\sum_{i=1}^{n}(x_{DMi} * w_{DMi})}{\sum_{i=1}^{n} w_{DMi}} \qquad \bar{x}_{DM\ equity} = \frac{\sum_{i=1}^{n}(x_{EMi} * w_{EMi})}{\sum_{i=1}^{n} w_{EMi}}$$

W: is the weight of each country or area in the assets under management in each area (DM or EM)
X: is the 3-month moving average of the standardized flow to a country or region
i: is the countries or area in the regional (DM or EM) index

- Relative preference:

$$Y(DM) = \bar{x}_{DMequity} - \bar{x}_{DM\ bond}$$

Weight of each country in the region

Region	Country	Weight	
DM	United States	73%	100%
	Eurozone	13%	
	Japan	6%	
	United Kingdom	5%	
	Swizerland	3%	
EM	Latin America	31%	100%
	Asia (ex China & Japan)	51%	
	Emerging Europe	18%	

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