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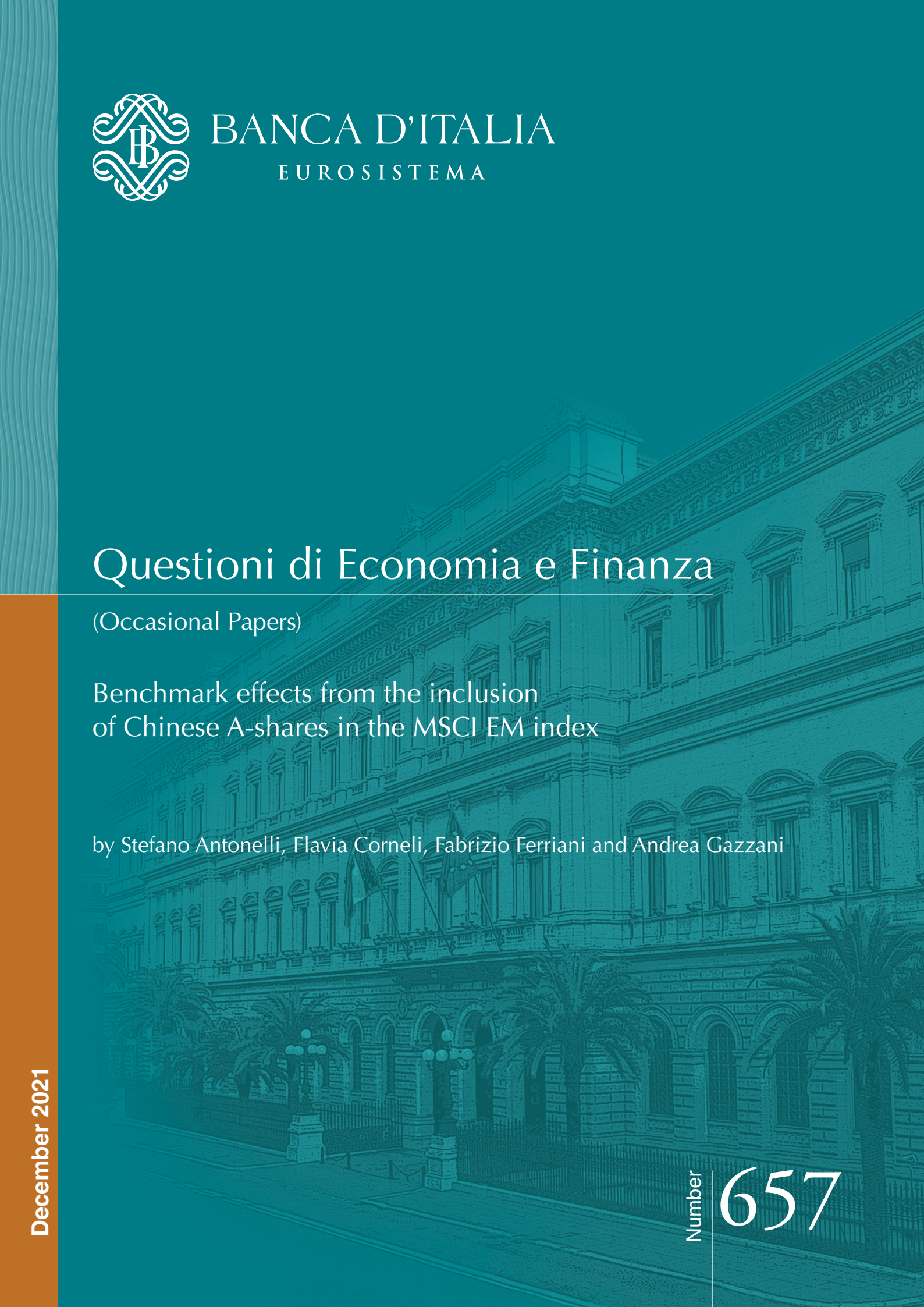

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BENCHMARK EFFECTS FROM THE INCLUSION OF CHINESE A-SHARES IN THE MSCI EM INDEX

by Stefano Antonelli*, Flavia Corneli[+], Fabrizio Ferriani[+] and Andrea Gazzani[+]

Abstract

We study the implications of benchmark indexing for emerging economies by focusing on the inclusion of Chinese A-shares in the MSCI EM index. Making use of a rich dataset on fund allocations and flows between 2015 and 2020, we document an escalating weight of Chinese exposure in mutual funds and an increasing concentration of fund portfolios. We rely on a Bayesian VAR model to show that the inclusion of A-shares in the MSCI EM index has fostered capital flows into China and has, at the same time, reduced the flows to the other emerging economies listed in the same index.

JEL Classification: F21, F36, G11, G15.

Keywords: benchmark indices, international portfolio flows, China.

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1 Introduction[1]

Three financial trends have reshaped emerging market economies (EMEs) in the last 10 years. First, capital flows are increasingly channelled through investment funds that are more procyclical (Raddatz and Schmukler, 2012) and more sensitive to global factors (Arslanalp et al., 2020) and to fire sales (Jotikasthira et al., 2012) than traditional intermediaries such as banks.[2] Second, a large share of these funds are managed passively to mimic the performances of a benchmark index (e.g. through ETFs), additionally rising the correlation across portfolio strategies (Arslanalp and Tsuda, 2015, Miyajima and Shim, 2014), the sensitivity to global financial conditions (Converse et al., 2020), and the vulnerability to crisis episodes (Ferriani, 2021). Third, China's role in fund allocations and, more generally, in the global financial system has been steadily rising. The inclusion of Chinese assets in global benchmarks is a crucial phenomenon and a unique experiment due to the extraordinary size of the Chinese markets. China has a $15tn bond market outstanding and a $10tn market capitalisation of all shares listed in Shanghai and Shenzhen.[3] Moreover, the sole Chinese government bond market outstanding currently stands at $4tn, representing the third world largest market after US and Japan.

The present work studies the implications of the inclusion of Chinese A-shares (renminbi-denominated equities traded in Shanghai and Shenzhen) in the MSCI EM index on the allocations of mutual funds specialized in EMEs, focusing on three questions. First, how is mutual fund portfolio allocation evolving vis-à-vis the increasing weight of China in the MSCI EM index? Second, what is the impact of this benchmark inclusion on the over-

[1]The preliminary results of this study are reported in the CGFS Report on "Changing patterns of capital flows" (BIS, 2021). We thank Pietro Catte, Alberto Locarno, Alessia Paccagnini, Giovanni Veronese, Fabrizio Venditti and participants at Bank of Italy internal seminars, 8th UECE conference, 2nd LTI/Bank of Italy workshop for useful comments and suggestions. We are indebted to Tomas Williams for sharing part of his code. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Bank of Italy.

[2]Investment funds now account for around one third of total portfolio flows to EMEs (Carney, 2019); the total asset under management (AUM) of investment funds specialized in EMEs amounts to approximately $2.5 trillion.

[3]At the end of September 2020 according to data from Bloomberg.

Figure 1: **Total Net Asset of Mutual Funds allocated to China**

The graph displays total net asset allocation of funds investing in China. Source: EPFR Global.

all mutual fund flows to China? Third, has this inclusion spilled over to other EMEs, affecting their inflows?

Our research fits in the empirical literature analysing the so-called "benchmark effect" (Raddatz et al., 2017) and focus on the set of channels through which international indices affect global asset allocations. Our analysis is twofold. First, we employ micro-level data on mutual funds investing in EME equities from January 2015 to January 2020 and study how the A-share inclusion is reflected in funds' allocation to Chinese stocks, analysing whether their investment strategies are driven by benchmark replication or active investments. We provide empirical evidence of how the allocation toward China has changed in the last four years, affecting the shares of other EMEs in funds' portfolios and increasing the overall funds' concentration.

Second, we exploit the more comprehensive EPFR (Emerging Portfolio Fund Research)

Global database to estimate the impact of changes in the MSCI EM composition on capital flows toward EMEs. As shown in Figure 1, investment funds' capital flows into Chinese equities have doubled between 2017 and 2020. We explore whether the gradual inclusion of A-shares in the MSCI benchmark has contributed to this process, controlling for standard push (global) and pull (domestic) factors (see Koepke, 2019, Hannan, 2018, Cerutti et al., 2019a, and Buono et al., 2020). By means of regression analysis and a Bayesian VAR model, we quantify the role of benchmark revisions on portfolio equity inflows to China and investigate the diversion of flows from other EMEs. The present study therefore interprets the benchmark effect as one possible element of the "pipes", defined by Carney (2019) as the structure of the financial system, that could affect capital flows and funds' allocations.

Our results indicate that: i) the increasing Chinese weight in global benchmarks resulted in a sizable recomposition effects of mutual fund portfolios that encompassed both passive and active funds and led to an increase in the geographic concentration of portfolios allocations; ii) index inclusion has significantly increased capital flows to China, channelled through mutual funds, after controlling for changes in fundamentals, market expectations, and global financial conditions; iii) aggregate fund flows toward EMEs other than China have fallen following the A-share inclusion in the MSCI EM index, with the most penalized countries being Turkey, South Africa, Philippines, and Mexico.

Our results are consistent with previous studies on the benchmark effect. A crucial work in this field is Raddatz et al. (2017) that show how active funds immediately respond to changes in their benchmark asset allocation, on top of the mechanical adjustment by passive funds. Moreover, they provide evidence on the effect of benchmark movements on capital flows, asset prices and exchange rates both in the directly interested country as well as in other economies included in the index. Pandolfi and Williams (2020) and Broner et al. (2021) confirm the benchmark effect with an event study analysis, namely the inclusion of EME assets in two major sovereign bond indices, looking specifically

at the impact of inclusion on asset returns. Pandolfi and Williams (2019) look instead symmetrically to upward and downward revisions in index weights in a special case of the mechanical index rebalancing of the J.P. Morgan Government Bond Index. They find that revisions affect bond prices and exchange rates through capital flow movements in the days around the rebalancing.

We bridge the aforementioned strand of the literature on the benchmark effect with the one on the drivers of capital flows to EMEs, which focuses on global and domestic factors to explain international capital movements. In this second domain, besides our study, other recent contributions have postulated a role for the benchmark indices as "pipes" of the global financial system. Cerutti et al. (2019b) introduce a dummy for those EMEs listed in major benchmark indices and find that portfolio flows into these EMEs are more sensitive to global conditions. This is confirmed by Arslanalp et al. (2020) that compare flows to EME dedicated bond funds to balance of payment bond flows and find that the first ones are more sensitive to global risk than the second, in particular when fund flows are channelled through ETFs. Finally, with regard to the growing role of China as a global player, our work is closely linked to recent contributions (e.g. Ahmed et al., 2019, Miranda-Agrippino et al., 2020, Fu et al., 2019, Barcelona et al., 2020) that highlight China as an increasingly important driver of global cycles. In the present analysis we shed light on the mutual fund industry as a channel through which Chinese shocks propagate to the rest of the world.

The rest of the paper is organized as follows. Section 2 summarizes the revision process of the MSCI EM index and introduces the dataset. Section 3 presents our empirical analysis: in the first part we focus on the impacts of index rebalancing in terms of geographical allocation, asset concentration, and drivers of investment reallocation in mutual funds' portfolios; in the second part we study how the revision of the MSCI EM index influenced the dynamics of capital flows toward China and other EMEs. Finally, Section 4 concludes.

2 Data

The revision of the MSCI EM benchmark to include domestic Chinese equities (A-shares) followed a long consultation period with the financial industry.[4] At first, MSCI announced in 2017 a two-step process to include A-shares into its benchmark with an inclusion factor (IF) up to 5% starting from June 2018; this was followed in February 2019 by a new revision that rose the total IF to 20% in three steps. Table 1 presents the timeline of the revision of the MSCI EM benchmark.

Table 1: **Inclusion of A-share in the MSCI EM index: a timeline**

Announcement date	Effective date	Inclusion factor
20 Jun 2017	01 Jun 2018	2.5%
20 Jun 2017	03 Sep 2018	5.0%
28 Feb 2019	29 May 2019	10%
28 Feb 2019	28 Aug 2019	15%
28 Feb 2019	27 Nov 2019	20%

The table displays the announcement dates, the effective implementation dates, and the inclusion factor of A-shares in the MSCI EM index.

We make use of several sources of data to create our sample. First, we retrieve micro-level data on equity mutual funds investing in EMEs from Morningstar. Then, we obtain aggregate equity portfolio flows to China from EPFR as well as data on a list of financial variables from Refintiv; these variables will be detailed and discussed in the empirical analysis provided in Section 3. The sample period starts in January 2015 and terminates in January 2020, encompassing the inclusion process of A-shares in the MSCI EM index.[5] As to micro-level data, we focus on both open-end funds and exchange-traded funds (ETF) included in the Morningstar category *Global emerging markets equity*, which comprises funds investing in EME financial assets with no country- or industrial-specific

[4] In addition to MSCI, since June 2020, FTSE Russell has successfully completed phase one of China A-share inclusion into its global equity benchmarks (with China now constituting approximately 6% of the FTSE Emerging Index through 1,051 large, medium and small- cap A-shares).

[5] The sample period deliberately terminates before the Covid-19 crisis as the outburst of the pandemic triggered a period of unprecedented volatility and turmoil in financial markets. In turn, this may result in extreme nonlinearities in the data which are difficult to accommodate and are nevertheless out of the scope of this research.

constraints on the composition of the fund portfolio. The Morningstar database is survivorship bias-free and also includes merged and liquidated funds; for funds reporting multiple share classes, we only consider the primary share class as identified by Morningstar in order to avoid double counting issues. The sample consists of 1201 unique mutual funds for which Morningstar provides a large set of characteristics including but not limited to net flows, fund returns, assets under management, geographical composition of the fund portfolio[6], prospectus benchmark, tracking error that measures the deviation of the fund return from its benchmark and is used to classify funds in the following.[7]

We partially follows Raddatz et al. (2017) to classify mutual funds into four categories with respect to the extent of active management. To this purpose, we consider the fund monthly tracking error and compute its average for each fund over the whole sample period. The average tracking error distribution is divided into three intervals. Funds in the first tercile, i.e. those with the lowest average tracking error are labeled as "explicit indexing", funds in the second tercile as "closet indexing", and funds in the third tercile as "mildly active". ETF funds are assigned to the explicit indexing category independently of their average tracking error value. Finally, funds that report neither the prospectus benchmark nor the fund tracking error are assigned to category "truly active". Sample descriptive statistics are presented in Table 2.

[6]On this point we emphasize that there is no perfect correspondence between Morningstar and MSCI with respect to the list of emerging countries. Country exposure at the fund level is available for the following countries classified as emerging by Morningstar: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, Slovakia, South Africa, South Korea, Taiwan, Thailand, Turkey, Venezuela, and Vietnam. According to MSCI, the following countries are classified as emerging as of early 2020: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey, and the United Arab Emirates. For this reason, the analysis in terms of geographical exposure is limited to those countries classified as emerging by MSCI and for which Morningstar provides the corresponding fund exposure.

[7]To minimize the impact of outliers, our measure of monthly tracking error actually corresponds to a 12-month moving average. Data on prospectus benchmark and tracking error are not always available; funds not reporting this information are classified as "truly active" funds as explained in this Section.

Table 2: **Descriptive statistics by fund level of benchmarking**

	Mean	St.Dev.	25p	50p	75p
			Explicit indexing		
Monthly net flows (US$ mln)	2.14	67.76	-1.72	-0.00	2.55
Monthly return (%)	0.39	4.53	-2.98	0.46	3.08
Tracking error (%)	3.00	1.19	2.21	2.91	3.62
China share (%)	26.10	6.07	22.69	26.80	30.31
AE share (%)	4.34	5.85	1.03	2.78	5.98
Fund age (years)	11.95	7.29	6.19	9.76	18.04
			Closet indexing		
Monthly net flows (US$ mln)	-2.20	58.73	-1.36	-0.00	1.13
Monthly return (%)	0.41	4.41	-2.77	0.53	3.15
Tracking error (%)	4.64	1.25	3.77	4.49	5.36
China share (%)	23.23	8.07	18.35	23.96	28.82
AE share (%)	7.38	6.91	1.77	6.06	11.18
Fund age (years)	11.10	6.61	6.53	9.43	14.20
			Mildly active		
Monthly net flows (US$ mln)	0.10	33.97	-0.96	-0.00	0.97
Monthly return (%)	0.36	4.68	-2.71	0.40	3.20
Tracking error (%)	6.91	2.46	5.30	6.49	8.15
China share (%)	21.65	11.10	14.60	23.55	29.35
AE share (%)	10.46	14.41	2.58	6.20	14.59
Fund age (years)	10.28	6.10	6.45	8.85	12.44
			Truly active		
Monthly net flows (US$ mln)	1.16	25.02	-0.44	-0.03	0.12
Monthly return (%)	0.28	4.60	-2.82	0.38	3.09
Tracking error (%)	.	.	.	.	.
China share (%)	20.06	14.07	8.90	22.38	29.01
AE share (%)	10.05	13.87	1.28	5.22	12.40
Fund age (years)	9.36	5.42	5.21	8.87	12.69

Descriptive statistics on mutual funds classified with respect to the level of active management, from explicit indexing (lowest active management) to truly active (highest active management). *Monthly net flows* are monthly net fund flows in US$ millions; *Monthly return* is the fund unadjusted simple monthly return; *Tracking error* is defined as the volatility of excess returns relative to the fund benchmark; *China share* is the total share of Chinese securities in the fund portfolio, regardless of the denomination currency; *AE share* measures the fund exposure to equity issued by firms located in advanced economies (AE); *Fund age* measures the fund age in years.

3 Empirical analysis

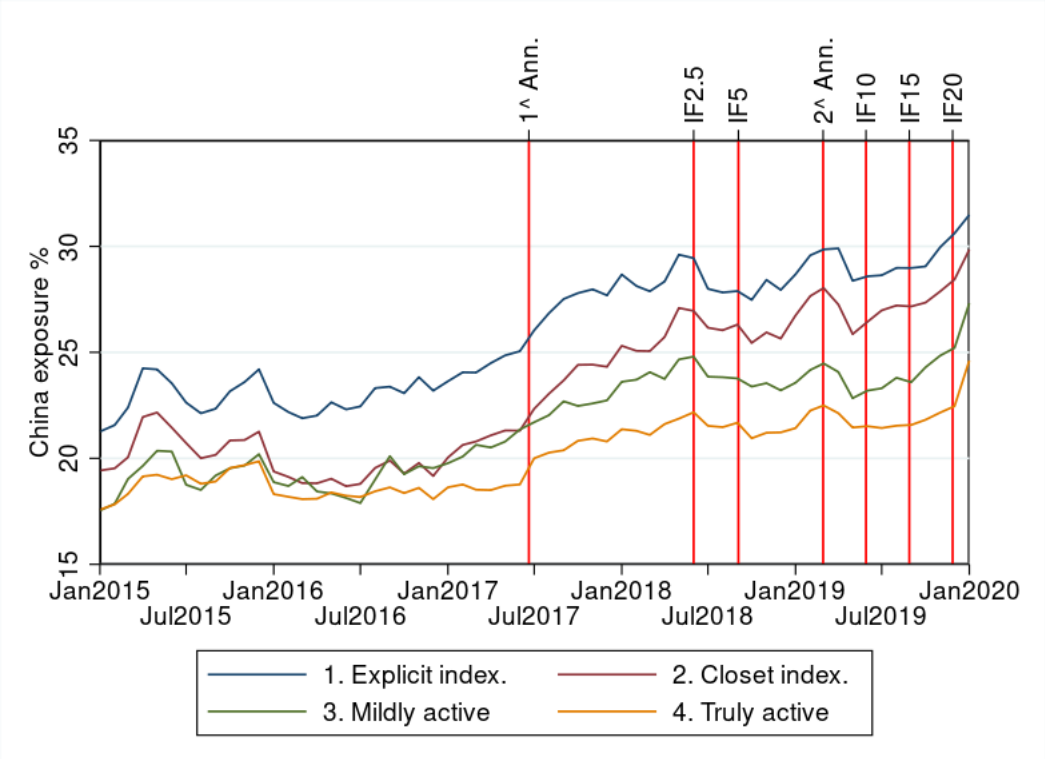
We divide the empirical analysis into two subsections. In the first part, we rely on microdata from Morningstar to highlight some key implications of the MSCI EM index revision. In particular, we focus on the geographical reallocation patterns and on the decomposition of factors shaping the rebalance of funds' portfolios, distinguishing between active and passive investment strategies. In the second part, we present a more structured analysis where we study how the reshuffling of a major market benchmark altered the dynamics of flows toward China and other emerging market economies.

3.1 Evidence from microdata on funds' portfolios

Figure 2 shows the average exposure to Chinese assets, i.e. not limited to renminbi denominated A-shares but including all type of Chinese equity (e.g. B-share and H-share); again we differentiate mutual funds with respect to their degree of active management.[8] Some results are in order by inspecting Figure 2. First, we observe a generalized upward trend of the average exposure to Chinese assets which likely reflects the increasing integration of China in global financial markets; this pattern is pervasive across all fund categories but more evident since early 2017. Second, the average exposure to Chinese equity is strongly correlated with the portfolio management style: funds closely tracking the MSCI EM index always exhibit the highest average share of Chinese securities in their asset portfolio, larger than 30% at the end of the sample. Third, we observe that the average Chinese weight responds quite differently to the two revisions of the MSCI EM benchmark. In the first episode, the exposure toward China adjusted almost immedi-

[8]Country weights are not adjusted to take into account the price effect. Although we acknowledge that country weights can evolve not only because of a change in the fund portfolio but also because of the market dynamics, in this study we omit this adjustment as it represents a non-trivial exercise, which is beyond the scope of this analysis, and somehow made more complicated by the heterogeneous management styles across funds. However, we include the Chinese equity performance in our BVARX model to control for such a price effect and identify a benchmarking shock that is cleansed from past and contemporaneous changes in equity prices.

Figure 2: **Exposure to Chinese assets and degree of active management**

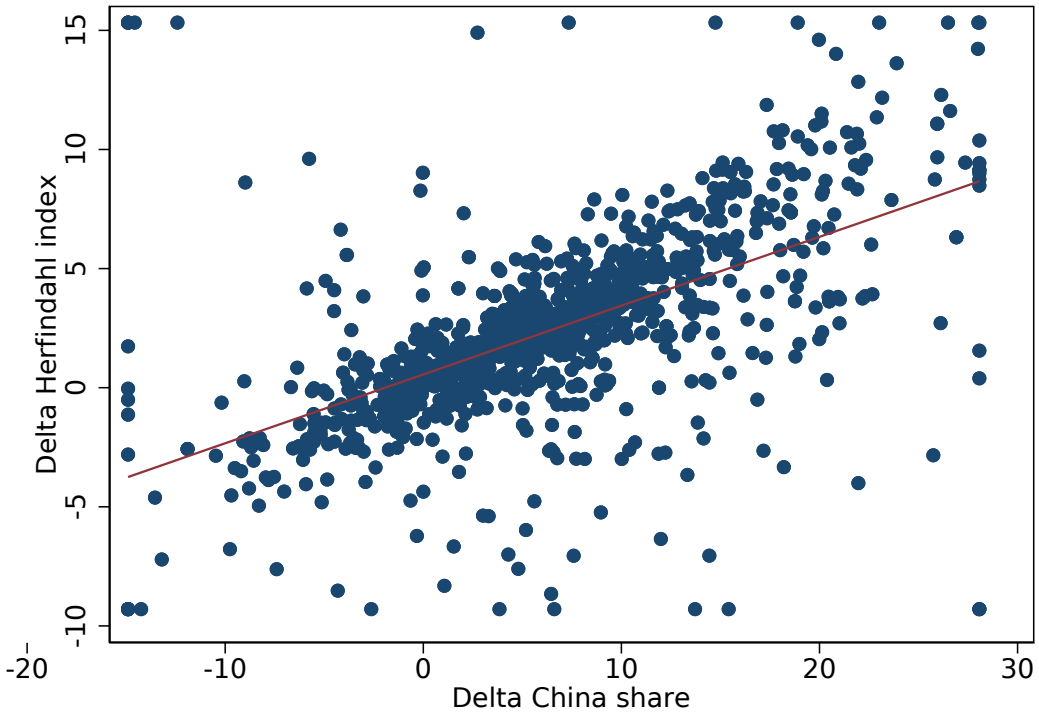


The graph displays the average exposure to Chinese equity distinguishing across funds with respect to their degree of active management, from "explicit indexing" funds (lowest active management) to "truly active" funds (highest active management). The graph displays the announcement dates of MSCI EM index revisions as well as the effective dates in which the inclusion factor (IF) was adjusted.

ately after the announcement of the benchmark revision, whereas the picture turns out to be quite different in the aftermath of the second revision announced by MSCI, plausibly because the time window between the announcement and the effective implementation was definitely narrower and the variation of the China IF was also substantially larger. Indeed, as regards the 2019 episode, the review of the IF triggered an upward movement in the Chinese weight starting from May 2019 (i.e. after the first step of the process), although the adjustment definitely accelerated since August 2019.

As it is reasonable to expect, the increasing weight of Chinese equities produced significant effects in terms of portfolio concentration. Figure 3 offers a graphical insight of this evidence: funds with the largest increase in the portfolio exposure to Chinese equity

Figure 3: **Exposure to Chinese assets and portfolio concentration**

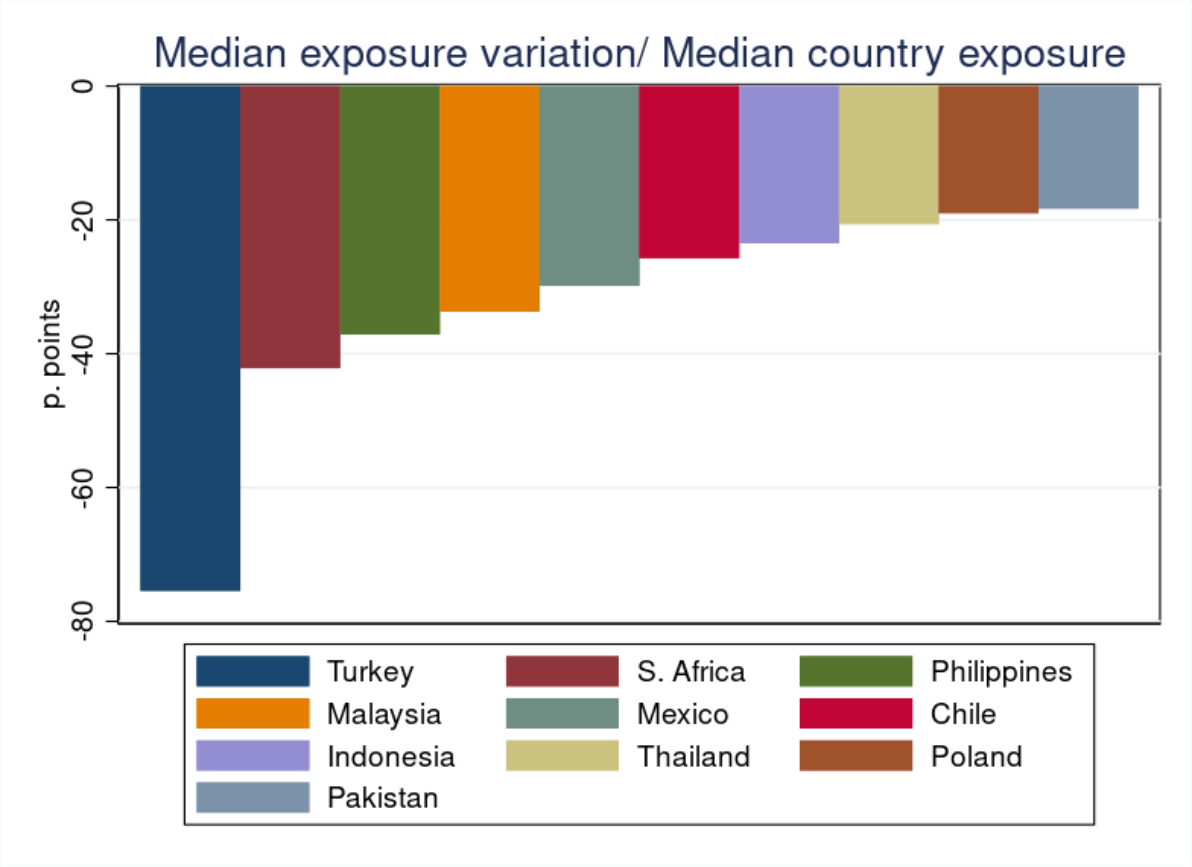


The graph displays the relation between the variation in a fund exposure to Chinese equity and the corresponding variation in the portfolio country concentration measured via Herfindahl index.

were also the funds that increased the most their overall country concentration. This fact is especially critical from a financial stability perspective as it reflects the increase in portfolio similarities and may amplify the vulnerabilities stemming from the rapidly growing use of passive investment vehicles that mechanically replicates global equity benchmarks, as highlighted by Miyajima and Shim (2014), IMF (2019b), and IMF (2019a) among many others.

The increasing exposure of mutual funds toward Chinese securities produced important changes in the relative weight of other EMEs in the MSCI EM benchmark. According to MSCI, the weight of Chinese equity in the MSCI EM index at the end of 2019 was larger than the combined weight of the three largest constituents of the index excluding China, namely South Korea, Taiwan and India. Several countries lost some of their rela-

Figure 4: **Impact of A-shares inclusion in the MSCI EM index**



The graph displays the 10 most impacted EMEs from MSCI inclusion of Chinese A-shares. The impact is measured as the median variation of the country exposure following both revisions of the MSCI EM index over the median country exposure computed throughout the whole time span.

tive importance in favour of China as reported in Figure 4, where we present the 10 most impacted countries from A-share inclusion in the MSCI EM benchmark. The median variation in country exposure with respect to the median country weight was especially large (>30%) in Turkey, South Africa, Philippines, and Malaysia.

Finally, we estimate how much of the mutual fund flows is driven by the benchmark factor, i.e. by the reshuffling of index constituents. To this purpose we follow the decomposition illustrated in Raddatz et al. (2017) and refer to their paper for a comprehensive

explanation of the methodology. We first estimate the following regression:

$$w_{it} = \gamma + \delta_t + \alpha w_{it}^B + \epsilon_{it}$$

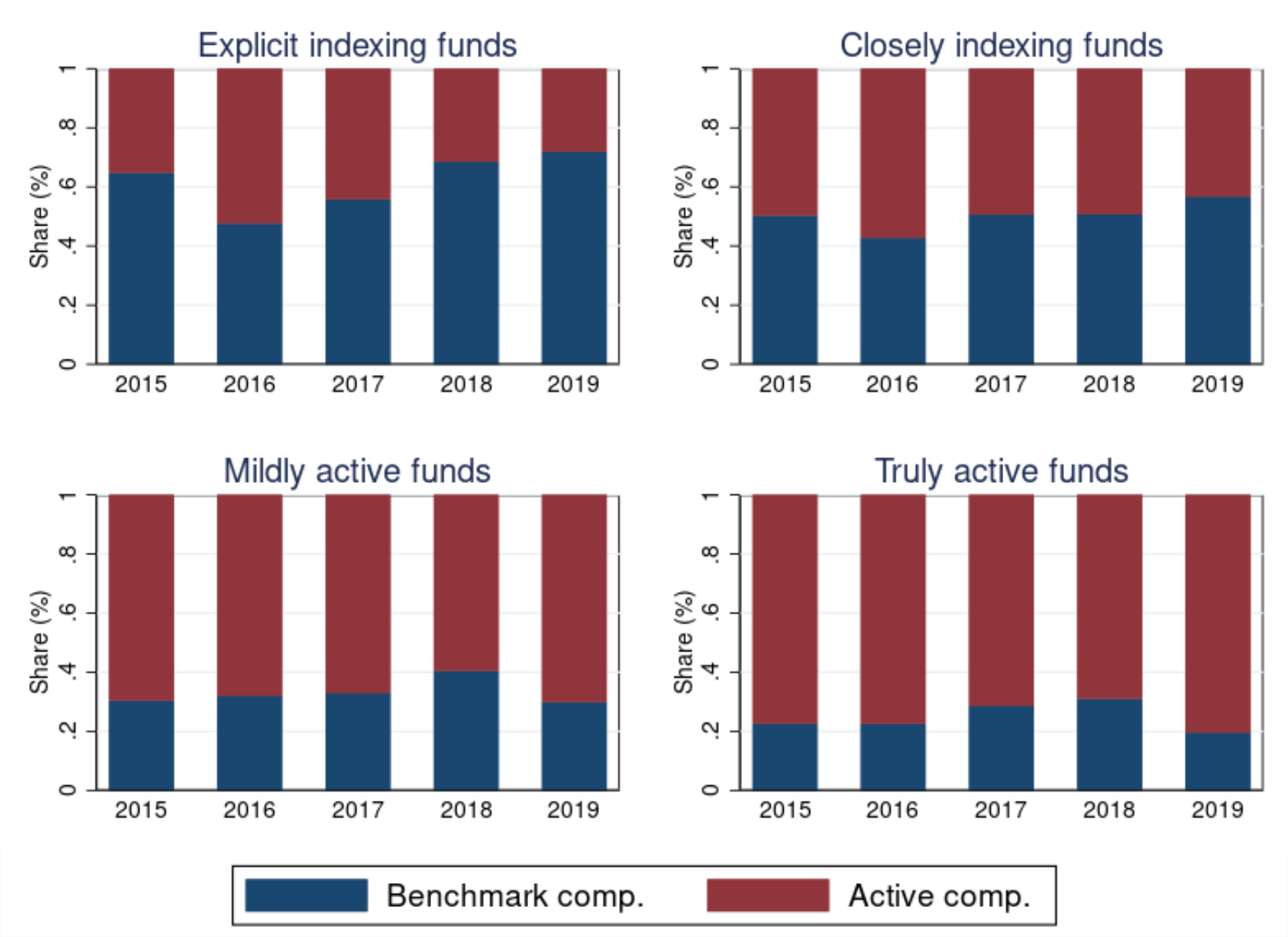
where w_{it} is the weight of China in fund i at month t, γ is a constant term, δ_t are year fixed effects, w_{it}^B is the weight of China in the MSCI EM index proxied by the average exposure to China of funds with the lowest tracking error (<5$^{\text{th}}$ percentile), and ϵ_{it} is the error term. Our proxy allows for a continuous representation of the index composition, as opposed to the actual MSCI EM index whose changes are discrete and do occur at most four times per year when MSCI announces its periodic revisions.[9] We are interested in the parameter α that measures the responsiveness of the fund weight to the corresponding exposure in the MSCI index. We run the regression for each fund category (from explicit indexing to truly active) to obtain a specific estimate of α for different levels of active management. Then, we decompose flows to China F_{itc} of fund i at time t as follows:

$$F_{itc} = \alpha w_{it}^B F_{it} + \tilde{A}_{it}\left[\alpha w_{it}^B - \alpha w_{it-1}^B \frac{R_{mt}}{R_{it}}\right] + \Delta_{it}^B F_{it} + \tilde{A}_{it}\left[\Delta_{it}^B - \Delta_{it-1}^B \frac{R_{mt}}{R_{it}}\right] \quad (1)$$

where F_{it} are total flows to fund i at time t, $\tilde{A}_{it} = R_{it}A_{it-1}$ is the value of fund assets A at time t, R_{it} is the fund return, R_{mt} is the return of the China's equity market benchmark (CSI 300), and $\Delta_{it}^B = w_{it} - \alpha w_{it}^B$. The four terms in Equation 1 allow to decompose fund flows to China into a benchmark and an active component. The first term captures flows allocation determined by the benchmark weight, while the second term accounts for asset reallocation carried out by managers in response to an exogenous change in the benchmark weight. The third term captures how flows are allocated according to the active weight as measured by the deviation of fund exposure from its benchmark counterpart, and the last term identifies the active asset reallocation component performed by fund

[9]Our proxy includes a group of around 40 funds, which are the closest to the benchmark but, being a group, do not suffer from idiosyncratic shocks (e.g. liquidity, redemption and so on) that could characterize a single fund.

Figure 5: **Variance decomposition of flows into benchmark and active component**



The figure displays the results of a variance decomposition exercise of fund flows to China into a benchmark and active component as illustrated in Raddatz et al. (2017). For each year we report the average share of the two components; the exercise is replicated across different fund categories with respect to the degree of active management.

managers. We run a variance decomposition exercise and compute for each year/fund category the share of benchmark (terms 1 and 2) and active (terms 3 and 4) component behind fund flows to China. Results are displayed in Figure 5. We immediately notice that the share of variance explained by the so-called "benchmark effect" is larger for explicit and closely-indexing funds, while it decreases as the extent of active management declines. As a second remark, we also notice that, especially for the first two fund categories, the benchmark component has increased since 2018 i.e. when MSCI started the implementation of its benchmark revisions. The benchmark component is generally very low for truly active funds, and somehow even countercyclical in 2019.

3.2 Estimating the impact of benchmark revisions on capital flows

In order to gauge the impact of the inclusion of A-shares in the MSCI EM on equity capital flows toward China, we first perform a preliminary regression analysis and then we employ a more structural analysis by means of a Bayesian VAR model. The purpose of the two exercises is to investigate how a micro-calibrated shift toward Chinese assets impacts the overall dynamics of the mutual fund industry focusing on EMEs.

In our first exercise, we consider monthly EPFR global fund flows toward China as the dependent variable and inform our analysis on the traditional subdivision of flows determinants proposed by the literature (in line with, among others, Fratzscher, 2012, Fratzscher et al., 2018). The relevant explanatory variables encompass domestic characteristics (pull), global drivers (push), and financial sector changes (pipe). The shift in the Chinese share in the MSCI EM index, which is the focus of this study, belongs to the latter category. We employ the proxy of the benchmarking level introduced in the previous subsection that relies on micro-level data to identify the weight of China in funds characterized by the lowest tracking error (<5th percentile).

We follow previous contributions in this field to determine a set of additional controls that can be obtained with monthly frequency. As a push factor, i.e. external drivers that

Table 3: **Determinants of fund flows to Chinese equity**

	Flow (t)
Flow (t-1)	-0.006
	(-0.03)
Shares MSCI China	0.872***
	(3.45)
US Treasury spread	0.784**
	(2.81)
VIX	0.130
	(1.50)
US FFR - Shadow rate	0.343
	(0.99)
CF for t	0.082
	(0.21)
CF for t+1	0.039
	(0.07)
EMBI China	0.212
	(1.54)
CSI300 return	-0.034
	(-0.27)
N	61
R^2	0.384

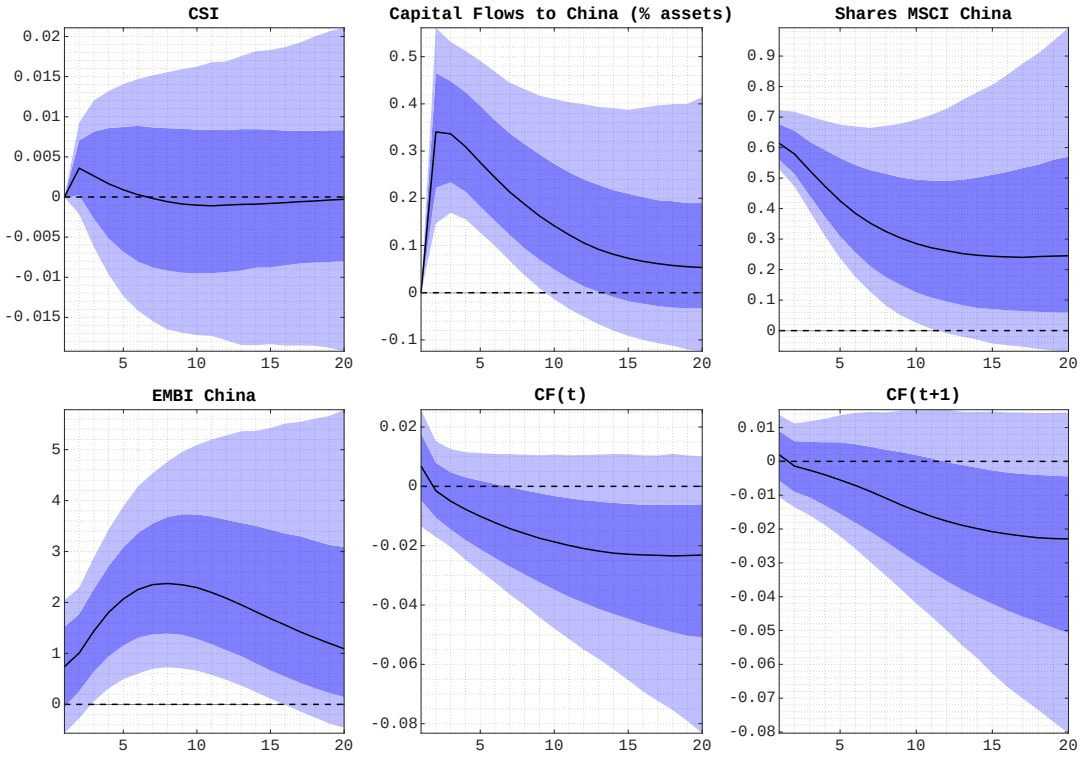
The table shows the coefficient estimates for the determinants of fund flows toward Chinese equities; robust t-statistics are displayed in parentheses. All pull variables (GDP Consensus forecast, EMBI spread, and CSI 300) are lagged. *, **, and *** denote significance at, respectively, the 10%, 5% and 1% level.

impact global investors' decision to pour money into EME financial assets, we employ the US Treasury term spread (10 year - 3 month Treasury yield spread), the Wu-Xia US shadow Federal Fund Rate (Wu and Xia, 2016), and the VIX. Conversely, pull factors relate to domestic conditions in EMEs supporting the arrival of foreign capital. These variables are lagged in order to at least partially control for endogeneity, and in the analysis we consider the GDP consensus forecast for current and subsequent year, the EMBI yield spread, and the monthly return of the Chinese stock market benchmark (CSI 300). Table 3 shows the results. Our key variable of interest, the benchmark share, positively relates to fund allocation into Chinese equity, suggesting that an increase of the Chinese weight in

the MSCI EM benchmark resulted in larger portfolio equity flows to China. Interestingly, the variable exhibits an overwhelming importance both in statistical and economic terms compared to the rest of the regressors.

The main empirical exercise exploits a Bayesian VAR model to assess the dynamic effects of an increase in the Chinese exposure of the MSCI EM benchmark (a "benchmarking shock") on capital inflows to China. The advantage of a VAR model compared to the previous regression comes from taking into account the feedback among the variables of the system. In particular, the information contained in several financial variables included in our VAR should mitigate issues related to the anticipation of changes in index benchmarks (given that those are announced by MSCI in advance). We employ the following variables: the proxy of the benchmarking level as previously defined (*share*), capital flows to China from the EPFR database (*flows as % of total assets*), and several US and Chinese financial indicators as control variables: *VIX*, US policy rate (r), US Treasury term spread employed also above (*term*), CSI300 Chinese equity index to control for price effects on funds' portfolio allocations, the China EMBI index (*EMBI*), Chinese GDP Consensus Forecast for the current (CF_t) and next year (CF_{t+1}). We rely on Bayesian inference due to the short sample over which Chinese benchmarking has become a prominent phenomenon. Our Bayesian VAR with exogenous controls (BVARX) is estimated over the sample 2015-2020M1 by employing standard inference based on a flat prior. US financial variables are included in the exogenous block. We employ two BVARX specifications to first study the effect of a benchmarking shock on the capital flows to China and then analyse the potential diversion of capital flows to other emerging markets. Impulse Response Functions (IRFs) analysis indicates that an increase in Chinese benchmarking leads to a statistically significant increase in capital flows to China, diverting capital flows from other emerging markets.

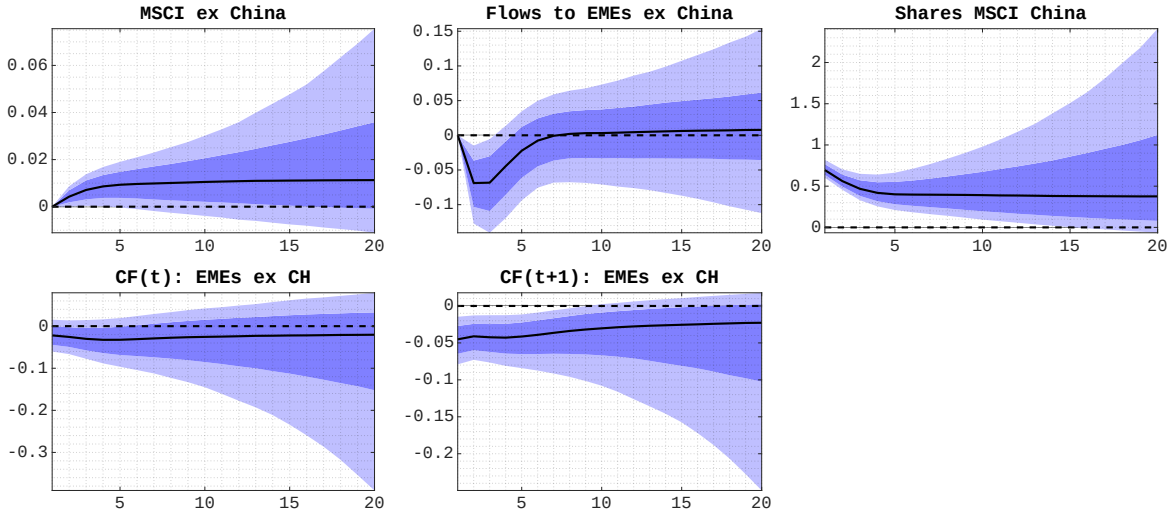
Figure 6: **BVARX China - IRFs to a benchmarking shock**



Note. The Bayesian VARX is estimated on data 2015M1-2020M1 with one lag under flat (Jeffreys') prior. The benchmarking shares, spreads, and Consensus Forecasts enter in raw values, whereas equity prices are included in log-levels. VIX, US policy rate, and US term spread are included in the exogenous block. The plot report median (black solid line) together with 68% (blue shaded areas) and 90% (light blue shaded areas) credible sets.

Domestic BVAR. The VAR includes 1 lag as suggested by AIC and BIC. The benchamarking shock is identified by ordering *share* third in the block of endogenous variable. Thus, the shock can affect contemporaneously all the variables in the system but CSI300, which we place on top of *share* to cleanse the innovation from price effects in the equity markets, and capital flows itself, to avoid mechanical increase in the equity flows to China after a benchmarking shock. The results reported in Figure 6 show that an increase in *share* leads to a significant increase in *flows*. Specifically, a 0.6 p.p. increase in the MSCI EM benchmarking shares of Chinese equity leads to a peak response of 0.35 p.p. in capital flows to China. Thus, the elasticity is close to 0.5, albeit slightly lower. The other endogenous variables in the system do not respond significantly but the EMBI yield-spread increase,

Figure 7: **BVARX EMEs - IRFs to a benchmarking shock**



Note. The Bayesian VARX is estimated on data 2015M1-2020M1 with one lag under flat (Jeffreys') prior. All the variables enter in log-levels but for than interest rates, spreads, and Consensus Forecasts that enter in raw values. VIX, US policy rate, and US term spread are included in the exogenous block. The plot report median (black solid line) together with 68% (blue shaded areas) and 90% (light blue shaded areas) credible sets. IRFs to a benchmarking shock: the blue solid line and the dark and light blue shaded areas are the median, the 68% and 90% credible sets.

which suggests a shift in the allocation of global investors portfolios from Chinese bond to equities.

Spillover Analysis. We investigate the spillovers of Chinese benchmarking to other emerging economies by employing the same BVARX approach used for the domestic analysis. The Chinese variables are now included in the exogenous block and the benchamarking shock is identified by ordering *share* third in the block of endogenous foreign variables. In analogy to the domestic BVAR we now substitute the CSI300 with the MSCI EM ex-China index to control for price effects on funds' portfolio allocations. Thus, the shock can affect contemporaneously all the variables in the system but for MSCI ex-China equity index prices and the equity flows to other EMEs. The results reported in Figure 7 highlight that other emerging economies are negatively affected by Chinese benchmarking with a significant reduction of capital inflows. As a consequence, Consensus Forecasts

for GDP in other EMEs for the following year fall on impact.

4 Final Remarks

The growing importance of benchmark-driven investment is reshaping the asset management industry and is increasing rapidly as investors seek inexpensive and easy-to-access investment opportunities. This structural change has not only a direct effect on global capital flow movements but it also brings relevant implications in terms of asset concentration, portfolio similarities, sensitivity to global financial conditions, and dependence to external factors (such as rating minimum requirements).

We contribute to the recent literature that has shown how the inclusion of an EME's asset in a benchmark can significantly impact capital inflows in that country as well as in the other economies whose shares in the index are revised. We focus on the inclusion of Chinese A-shares in the MSCI EM Index, which is a recent and prominent phenomenon given the dimension of the Chinese financial market.

We document that funds' exposure to China has been increasing, as a result of the inclusion of Chinese stocks in global equity benchmarks. This finding comes with a rising geographical concentration of funds specialized in EMEs. Our empirical analysis based on a Bayesian VAR model suggests that capital inflows to China have increased because of benchmark inclusion beyond what could be explained by push and pull factors; moreover, this has slowed down equity funds' allocation in other EMEs listed in the same index.

Given the dimension of the Chinese equity market, its weight in global asset allocation and benchmark indices is set to increase. The growing presence of China in international financial markets and the rapid shift in fund exposures due to fast benchmark reallocation is transforming China into a spillover originator with increasing impact on other economies. This could potentially expose even more the fund industry operating in EMEs

to economic as well as geopolitical news related to China.[10]

Finally, it should be emphasized that the tendency toward passive strategies that replicate index funds is accelerating also in other markets such as bonds (for example, according to data from EPFR, allocation to China of emerging market bond funds saw significant inflows following the announcement of the inclusion of Chinese government bonds in the FTSE Russell World Global Bond Index starting October 2021). Going forward, the potential impact of similar revisions of global benchmarks could amplify the disconnect of capital flows from domestic economic developments in EMEs and, possibly more relevant, spill over from EMEs to advanced economies.[11]

[10]Even if the inclusion was not significantly impacted by the Covid-19 pandemic, renewed US-China tensions at the end of 2020 have led to a slowdown of the integration process. In November 2020, President Donald Trump signed an executive order banning American investors from owning shares of Chinese companies that the White House alleges are support the Chinese military; in December 2020, the House of Representatives approved a bill aimed at imposing the delisting of Chinese companies from American exchanges for not complying with auditing oversight rules. Following these developments, several index providers announced the removal of a number of Chinese names from their benchmarks. Nevertheless, and in sight of a possible change in the foreign policy of the Biden Administration, the inclusion of Chinese financial assets in global benchmarks is likely deemed to continue, reflecting the growing economic importance of China.

[11]Chinese bonds are also increasingly present in the benchmarking activity. Bloomberg Barclays Global Aggregate Index on April 2019 announced the intention of adding Chinese government and policy bank bonds over 20 months taking China's weight in the index to over 6 percent; also, in October 2020, FTSE announced the inclusion of Chinese Government bonds in its FTSE World Government Bond Index starting in October 2021. The inclusion of renminbi-denominated bond in global benchmarks could bring inflows to China in the order of around $300 billions, see IMF, 2019b.

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