The role of different institutional investors in Asia-Pacific bond markets during the taper tantrum

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Abstract

Emerging markets have grown rapidly over the past two decades, and sovereign and corporate borrowers are increasingly reliant on bond financing. Given widespread concern over what will happen to emerging market bonds as central banks in major advanced economies start to unwind quantitative easing policies and raise interest rates, this paper examines the behaviour of different investors buying and selling emerging market government and corporate bonds around the 2013 taper tantrum. Using detailed security-level data on bond holdings by institutional investors from Thomson Reuters eMAXX, we find that mutual funds – which are subject to outflow pressures – tended to liquidate their bond holdings of emerging Asian bond markets, while insurance companies, annuities and pension funds – all of which are not subject to outflow pressures – bought extra bonds in these markets. We also find some evidence of global retrenchment during the taper tantrum. In particular, local (Asia-domiciled) funds bought emerging Asian bonds, and global (US-, UK- and Europe-domiciled) funds sold these bonds. These results suggest that policymakers need to foster a stable domestic investor base and make efforts to better understand the behaviour and incentives of different bond investors.

JEL classification: G11, G15, F21

Keywords: Asia-Pacific, asset managers, fixed income investment, institutional investors, taper tantrum

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1. Introduction

Emerging markets (EMs) are playing an increasingly prominent role in global finance. Many governments and firms in these economies have become increasingly reliant on bond financing. At the same time, there is widespread concern over what may happen to global emerging bond markets as central banks' quantitative easing policies reverse and interest rates rise.

One such scare happened in the summer of 2013 during the taper tantrum. Prompted by concerns that US interest rates might rise, bond prices dropped suddenly and violently throughout EMs. On 3 May 2013, upbeat news coverage on US employment triggered a bond market sell-off, which reverberated globally to both advanced economy (AE) and EM assets. On 22 May 2013, Federal Reserve Chairman Ben Bernanke issued a statement on tapering. This led high-yield bonds and equities to join the sell-off. Between 3 May and 5 July 2013, the 10-year US Treasury yield increased by 100 basis points, while the 10-year sovereign yields of Japan, Germany and the United Kingdom went up by around 30, 50 and 75 basis points, respectively. The yield on the composite EM high-yield index rose by 130 basis points. To alleviate market-induced tightening of funding conditions, the Federal Reserve, European Central Bank and Bank of England issued forward guidance in June and July 2013, but yields remained at elevated levels until the end of 2013. In this paper, we study the roles of different institutional investors during the taper tantrum.

Our goal in this paper is to comprehensively characterise the roles of different institutional investors during the taper tantrum by examining which investors were selling or buying bonds during this major sell-off period. In particular, we focus on the differences between mutual funds – which are subject to outflow pressures – and insurance companies, annuities and pension funds – which are not subject to outflow pressures. We also examine the differences between local and foreign investors, which may react differently during a crisis.

Using new, detailed data sets from Thomson Reuters eMAXX that show the level of institutional bond holdings, we examine how different investors bought and sold Asia-Pacific government and corporate bonds around the taper tantrum. According to BIS debt securities statistics, Asia-Pacific bond markets – both domestic and international – have grown tremendously, from USD 8.3 trillion in Q1 2000 to USD 33.9 trillion in Q1 2018. This large bond market setting provides rich opportunities for researchers to observe the action of market participants.

The focus of our paper is to investigate the distinctive actions of different types of institutional investors. Building on evidence in previous literature that is based on a cross-section of different mutual funds, institutional investors are classified in this paper by types (ie mutual funds vs insurance companies / pension funds / annuities). Building on previous evidence on country-level flow patterns, we are able to classify institutional investors by (i) fund domicile (local, regional foreign or global foreign), (ii) managing company domicile (local, regional foreign or global foreign) and (iii) by

mandate (funds investing in a country, in a region or globally).[2] We examine how these investors bought and sold bonds during the taper tantrum.

Prior research has examined various channels in which institutional investors play a role in perpetuating a financial crisis. The first channel is via an institutional fire sale due to pressure from mutual fund outflows (Feroli et al (2015), Morris, Shim and Shin (2017), Karolyi and McLaren (2017) and Goldstein, Hao and Ng (2017)). During a crisis, mutual funds face mounting outflows from end investors. These end investors may withdraw from the mutual funds due to irrational fear, or due to rational first mover advantage since the remaining shareholders may have to bear the liquidation cost of the illiquid assets. Faced with such outflows, mutual funds are forced to sell their assets to meet redemption demands, despite the fact that fund managers may want to keep the holdings or take advantage of the lower prices to buy more assets.

The second channel is through a global retrenchment process during crises (Broner et al (2013), Forbes and Warnock (2012), Giannetti and Laeven (2016) and Caballero and Simsek (2017)). Observing country-level flow patterns, these authors suggest that during expansions, foreigners invest more domestically while domestic investors invest more abroad. They propose that investors' main objective is to reach for yield during normal times. However, during a crisis they reach for safety. During such a period, there is retrenchment in both gross inflows by foreigners and gross outflows by domestic investors.

Another possibility is that the selling behaviour of bond investors is not fundamentally different during a crisis. Under a traditional international capital asset pricing model (CAPM) framework with homogeneous investors across the world, all investors sell a portion of their assets as risk premiums rise during a crisis. Under this scenario, there is no difference in buying and selling among different types of institutional investors.

Such different channels imply different responses from different institutional investors. Among institutional players in the Asia-Pacific bond markets, the largest are mutual funds, insurance companies, pension funds and endowments. Mutual funds have different geographic mandates and domiciles. These different investors face different constraints, which may dictate their responses to a market sell-off situation such as the taper tantrum.

Under the global retrenchment hypothesis, domestic investors would retrench in a crisis. This implies that non-Asia-Pacific domiciled funds would sell Asia-Pacific bonds and buy home-country bonds, while Asia-Pacific domiciled funds would buy their own country (or regional) bonds. Geographical mandates of funds may also affect the extent of their flight home bias. In a crisis, regional bond funds may be less likely to retreat from the overall Asia-Pacific region than global bond funds.

Under a fund-flow driven fire sale hypothesis, institutional investors facing outflows would sell their bond holdings, while those not facing outflow pressure would not sell. Flow pressure applies very differently across various institutional investors. Mutual funds have to meet outflow demands every day. Other institutional

[2] We can view a fund's domicile as a proxy for an investor base or a fund residence, and a fund's managing company's (ultimate) domicile as a proxy for a fund manager base or fund nationality. For example, a fund managed by PIMCO in California domiciled in Hong Kong SAR is a Hong Kong fund by fund domicile but a US fund by fund nationality.

investors, such as insurance companies, pension funds and endowments, do not face such daily outflow pressures. By the nature of their business, insurance companies invest in bond portfolios to meet long-term obligations coming out of insurance contracts. Similarly, pension funds and endowments invest in long horizons to match the liabilities (ie the needs of their constituents).

The final hypothesis is that bond investors are not fundamentally different during a crisis. Under this hypothesis, there should be no difference in buying and selling across institutional investor types nor across countries.

To test the aforementioned hypotheses, we investigate the differences across investor types by using detailed individual bond-level holdings data from Thomson Reuters eMAXX, supplemented by data from Lipper IM. Specifically, we formulate our research questions as follows:

1. Which investors sold or bought Asia-Pacific government and corporate bonds during the taper tantrum?
2. How does global entrenchment work on the fund level? Does fund domicile matter in flight home bias? Does managing company domicile matter? Do fund mandates matter?
3. Was the sale of bonds due to investor redemptions or discretionary selling?

Our paper contributes to international finance literature by bringing new fund-bond holding level evidence to the table. Previous evidence on global retrenchment is documented at the country level (Broner et al (2013), Forbes and Warnock (2012) and Caballero and Simsek (2017)). Our paper provides evidence on global retrenchment on the fund level. In particular, we document how fund mandate and fund domicile matter in flight home bias. Previous evidence on fund outflows only focuses on mutual funds (eg Feroli et al (2015), Giannetti and Laeven (2016), Morris, Shim and Shin (2017) and Goldstein, Hao and Ng (2017)). Our paper provides detailed evidence on how different institutional investor types face different constraints. Lastly, our paper has important practical implications for policymakers in Asia-Pacific economies who have regulatory and supervisory authority over different institutional investors and bond markets.

Recent literature has highlighted liquidity mismatch facing mutual funds holding illiquid assets such as corporate bonds. As Goldstein, Hao and Ng (2017) point out, corporate bond funds tend to hold illiquid assets. Compared to equities that trade multiple times throughout the day, corporate bonds may not trade for weeks and trading costs can be substantial. At the same time, corporate bond funds quote their net asset values daily and allow investors to redeem their money daily, despite the illiquidity of the underlying assets. This results in a significant mismatch between the illiquidity of the fund's holdings and the liquidity that investors holding the fund shares expect. This liquidity mismatch also implies a first mover advantage: investors redeeming today may impose large externalities on those investors who remain invested in the fund. Funds with a country mandate may sell but only due to flows. Other institutions (eg insurance companies) have little flow pressure and have a long-term horizon. Our paper provides evidence on these differences in the context of a crisis.

The paper proceeds as follows: Section 2 describes data and summary statistics used in this paper; Section 3 presents empirical questions and design; Section 4

provides empirical results; and Section 5 concludes with discussions on policy implications.

2. Data and summary statistics

We construct our dataset from various databases. The main database we use is Thomson Reuters eMAXX, which has been used in several papers (Becker and Ivashina (2015) and Bodnaruk and Rossi (2016)) but is still a relatively new source in international finance literature. The eMAXX database has been employed mostly in analysing portfolio allocations in developed economies. This database provides a comprehensive coverage of fixed income holdings by asset managers and institutional investors around the world. It contains quarterly data on the holdings at the security level, the characteristics of individual bonds and issuers, and details on funds and their managing firms.[3]

Our paper focuses on Asia-Pacific corporate and government bonds held by asset managers and other institutional investors domiciled all over the world. The Asia-Pacific economies we examine include Australia, China, Chinese Taipei, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand and Vietnam.

To select the funds used in the analysis, we first identify all distinct funds (including mutual funds, insurance funds, pension funds and annuity funds) holding at least one bond issued by an entity in the aforementioned Asia-Pacific economies. Next, we consider the funds that had consistent bond holdings data around the taper tantrum.

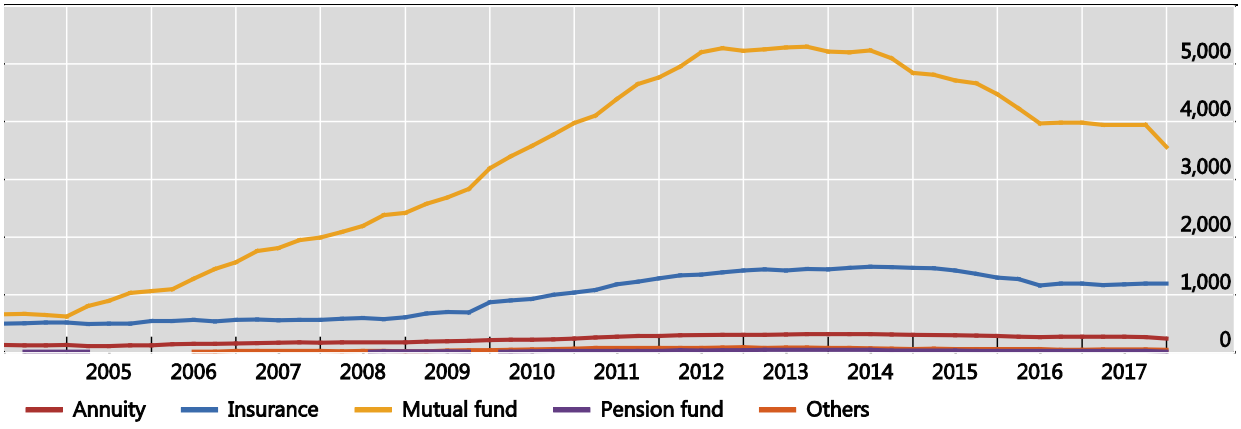
As a result, we carry out our empirical analysis with the following two samples of funds. The first sample contains information on 8,374 funds that have data at least for 14 quarters over the 20-quarter period from Q1 2011 to Q4 2015. During this period, the observations on mutual funds were 73% of the sample, while those on insurance companies accounted for 20% (Graph 1). The majority of all non-mutual fund investors (ie insurance companies, annuities, pensions and others[4]) were domiciled in the United States and Canada. In particular, in terms of the US dollar value of corporate bond holdings, mutual funds accounted for 59%, while insurance companies for 39%. In the case of government bonds, mutual funds held over 90% of the total US dollar value of the bonds in our sample (Graph 2).

[3] The BIS has access to this database for the period from Q1 2004 to Q4 2017. The eMAXX dataset is compiled by Thomson Reuters from regulatory filings around the world. eMAXX has relatively good coverage of bond holdings by US and Europe-domiciled mutual funds and US insurance companies, modest coverage of bond holdings by mutual funds domiciled outside the US and Europe, and poor coverage of insurance companies outside the United States. Unfortunately, it has a relatively poor coverage of bond holdings by local/domestic mutual funds and institutional investors in smaller Asia-Pacific economies due to lack of reporting requirements at the security level.

[4] Others include hedge funds, foundations, endowments and governments.

Number of institutional investor by type

Full sample of funds — Graph 1



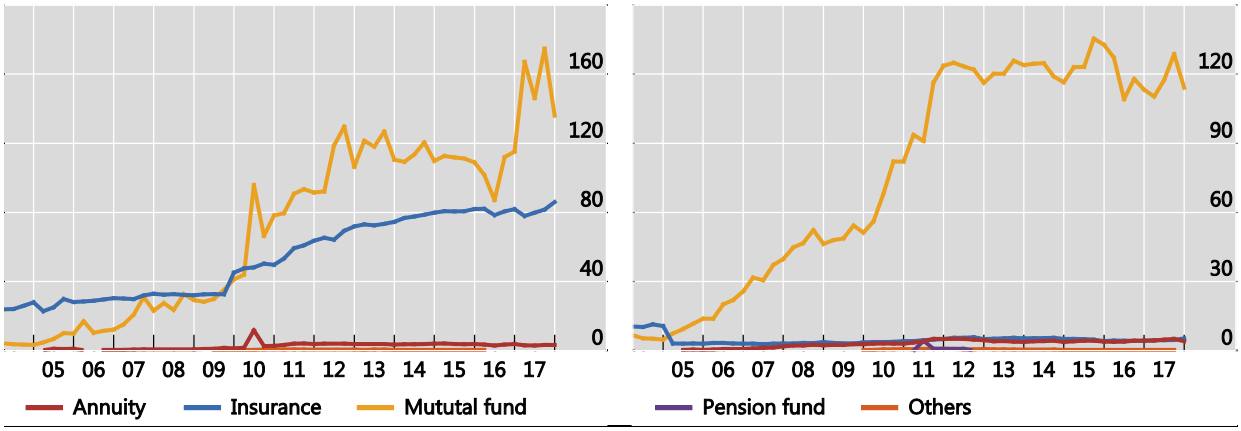
Sources: eMAXX; authors' calculations.

Size of institutional investors by investor type in Asia-Pacific issued bonds

In billions of US dollars; full sample of funds — Graph 2

A. Corporate bonds

B. Government bonds

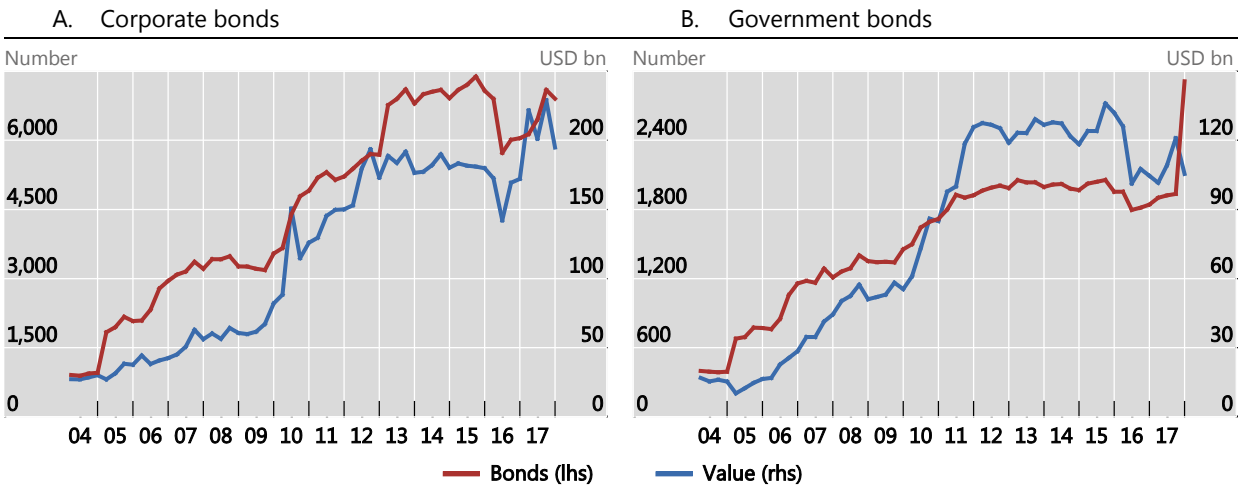


Sources: eMAXX; authors' calculations.

During the sample period, all funds in the full sample held 6,342 distinct corporate bonds and 1,985 distinct government bonds on average (Graph 3). Regarding the currency denomination of the bonds, US dollar-denominated bonds dominated the sample of corporate bonds, accounting for 60% of total dollar value, while Asia-Pacific local currencies accounted for 34% on average (Graph 4). In the case of government bonds, Asia-Pacific currencies were 85% of the total dollar value, while US dollar-denominated bonds were about 15% on average.

Total number and market value of distinct Asia-Pacific bonds

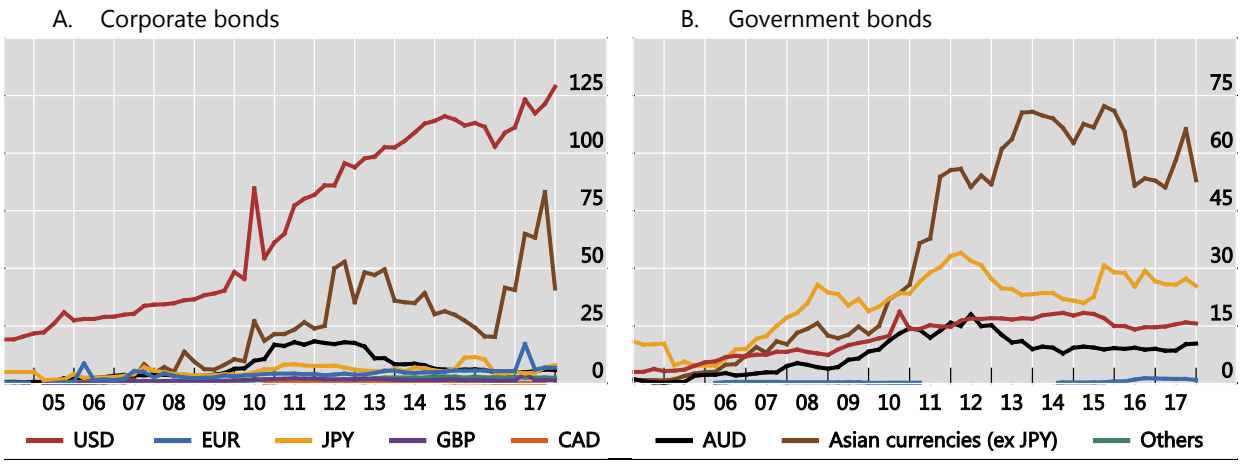
Full sample of funds — Graph 3



Sources: eMAXX; authors' calculations.

Size of Asia-Pacific bond holdings by currency of issue

In billions of US dollars; full sample of funds — Graph 4

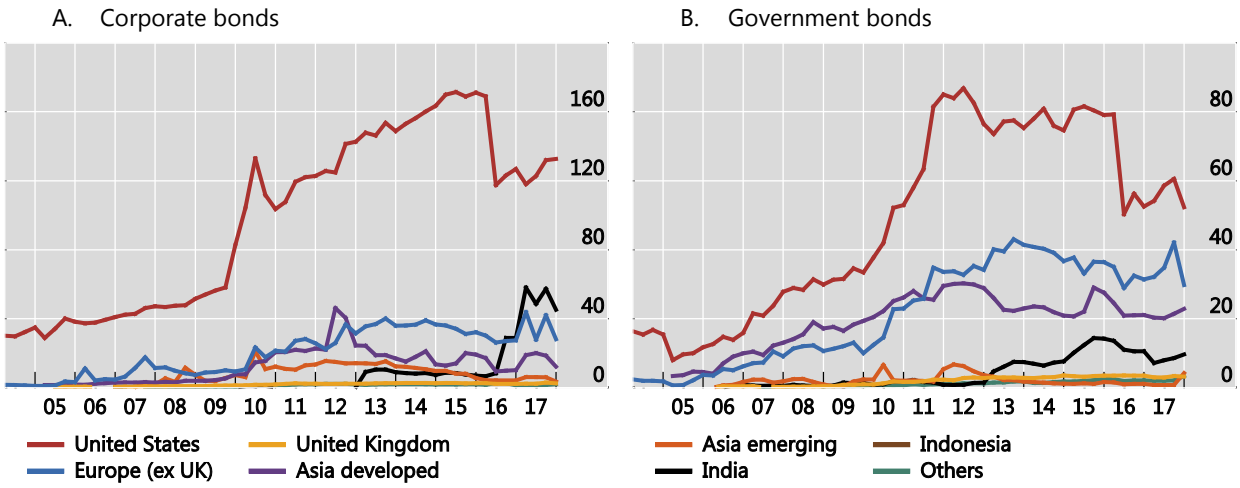


Sources: eMAXX; authors' calculations.

Graph 5 shows the US dollar amount of bond holdings by institutional investor domicile. At the end of Q4 2015, 70% of the total holdings of corporate bonds were held by US-domiciled funds, while Asia-Pacific domiciled funds held around 13%. In the case of government bonds, US-domiciled funds held about 52% of the total value, and Asia-Pacific domiciled funds 21%.

Size of Asia-Pacific bond holdings by fund domicile

In billions of US dollars; full sample of funds — Graph 5



Sources: eMAXX; authors' calculations.

Table 1 shows the distribution by issuer nationality of bonds held by the funds in our full sample as of Q4 2015. Panel A shows that US corporate issuers accounted for 73% of the total dollar value in our sample, while corporate issuers in China, Hong Kong SAR, India, Japan and Korea summed up to 1% of the total value of corporate bonds held by the funds in our sample. Regarding government bonds, Panel B shows that the United States accounted for 62% in terms of US dollar value. Among most notable Asia-Pacific issuer countries in the sample, China, Hong Kong SAR, India, Indonesia and Japan accounted for 4% of the total US dollar value. Finally, Panel C shows the number of funds and managing firms in our sample holding bonds issued by entities in each economy as of Q4 2015.

For the second sample, we supplement the eMAXX dataset with global mutual fund data from Lipper, a source that provides investor flows, fund-level returns, fund mandates, fund domiciles, total net asset value and other information related to the funds. As a result of name-matching the list of funds in both databases, we obtain our second sample comprising data for 1,770 funds. Table 2 provides descriptive statistics of the full sample and the matched sample.

Finally, we complement our database with various macroeconomic and financial control variables from different sources such as Bloomberg, Moody's, Standard & Poor's, the International Monetary Fund's World Economic Outlook, the BIS and national data sources. In particular, we consider country factors such as GDP growth, exchange rates, current account/GDP and sovereign credit ratings, as well as global factors such as the VIX Index.

For the construction of the change in holdings of bond i by fund j as the dependent variable in Tables 3–8, we use the par amount of bond holdings provided by eMAXX. The eMAXX data are based on regulatory disclosures by asset managers and institutional investors. In the case of the United States, the data on insurance companies come from the regulatory disclosures to the National Association of Insurance Commissioners, while the data on mutual funds come from the disclosure to the Securities and Exchange Commission. Disclosure by institutional investors in other jurisdictions and sectors is less comprehensive and, in many cases, voluntary. Given this fact, not all the funds report consistently every quarter.

To overcome this issue, we assume that if a fund holds a bond in a quarter that does not appear in the database in the next quarter but appears again in the near future, we carry over the amount of bond holdings to compute the correct change over the interim period. In addition, we control for funds that are co-managed by different firms to avoid double-counting of bond holdings. To avoid data errors present in the database, we winsorise the data at the 1% level on each tail.

When we construct the dependent variable used in Table 9, we normalise the amount of each bond held by each fund by the total amount of holdings of Asia-Pacific issued bonds held by that specific fund in the given quarter. To construct the independent variable based on flow data from Lipper IM, we normalise investor flows to a fund during a given quarter by the total net asset value of the fund at the beginning of the quarter. We winsorise this ratio at the 1% level on each tail. In addition, we generate different dummy variables to control for the type of institutional investor, fund location (domicile) and the taper tantrum period.

3. Empirical hypotheses and design

3.1. Empirical hypotheses

We aim to test three hypotheses based on the implications for institutional investors' behaviour during the taper tantrum. In our empirical work, we examine on an aggregate level what types of institutions bought and sold Asia-Pacific government and corporate bonds during the taper tantrum. Under a fund-flow driven fire sale hypothesis, institutional investors facing outflows would sell their bond holdings, while those not facing outflow pressure would not sell. Flow pressure applies very differently across various institutional investors. Mutual funds have to meet outflow demands, while insurance companies, pension funds, annuities and endowments do not face such daily outflow pressures. The main hypothesis we examine is whether during the taper tantrum mutual funds sold more Asia-Pacific bonds, while insurance companies, pension funds and annuities bought Asia-Pacific bonds.

In investigating the flow-driven hypothesis, we also examine whether mutual funds may also assess the impact of country-level market liquidity on the choice of purchases and sales. If meeting outflows is the only reason, then mutual funds may not only sell all bonds equally to meet their outflows, but may sell the more liquid countries first. In particular, driven by a fire sale the mutual funds may withdraw their investment from more liquid countries first (such as Korea) than from less liquid countries (such as Thailand). However, if mutual funds are reaching for safety as they meet outflows, then they may sell emerging Asian bonds first and may not sell or

even buy developed Asia-Pacific bonds. Mutual funds selling only to meet outflows may sell developed Asian bonds first, while mutual funds that are also reaching for safety may sell emerging Asian bonds during the taper tantrum. Since insurance companies, annuities and pension funds are not subject to investor outflows, they may not be affected by flows concerns during the taper tantrum.

A global retrenchment process during crises suggests that during expansions, foreigners invest more domestically while domestic investors invest more abroad. The main objective of the investors is to reach for yield. However, during a crisis, investors reach for safety. During such a period, there is retrenchment in both gross inflows by foreigners and gross outflows by domestic investors. The main question is whether during the taper tantrum global investors sold Asia-Pacific bonds and bought their home-country bonds while Asia-Pacific investors bought Asia-Pacific bonds and sold non-Asia-Pacific bonds. We examine the country/region domiciles of the buyers/sellers during the taper tantrum, eg domestic-domiciled, Asia-Pacific domiciled or US-/Europe-domiciled mutual funds. We also examine how important the funds' nationality (ie the domicile of the fund management companies) is compared to or in addition to the funds' domicile in explaining their purchase and sale behaviour.

A traditional international CAPM framework with homogeneous investors across the world predicts that all investors sell a portion of their assets as risk premiums rise during a crisis. Under this scenario, there is no significant difference across investor types and investor domiciles in their purchase/sales patterns of Asia-Pacific bonds during the taper tantrum.

3.2. Empirical design

We begin with a simple regression framework to examine international portfolio allocations. In particular, for Question 1 in Section 1, we first look at which types of investors sell Asia-Pacific bonds. The basic regression equation is:

$$I_{i,j,t} = \alpha + \gamma_1 C_{j,t}^1 + \cdots + \gamma_n C_{j,t}^n + \varepsilon_{i,j,t},$$

where the dependent variable $I_{i,j,t}$ is defined as the "change of holdings" by investor j in bond i in quarter t. The independent variables, denoted by $C_{j,t}$, represent various explanatory and control variables, and include a taper tantrum dummy (which is equal to 1 for Q2–Q4 2013, and zero otherwise), mutual fund dummy, and the interactions term, 'taper tantrum dummy x mutual fund dummy'. In another specification, we have a taper tantrum dummy, insurance/annuity/pension dummy, and the interaction terms, 'taper tantrum dummy x mutual fund dummy' and 'taper tantrum dummy x insurance/annuity/pension dummy'. In all specifications, we include investor j fixed effect and year-quarter t fixed effect in our regressions, and cluster the standard error by investor.

Next, we consider which domiciles of investors sell Asia-Pacific bonds. Now, the independent variables include a taper tantrum dummy, global fund dummy (for US-, UK- and Europe-domiciled funds), Asia-Pacific domiciled regional fund dummy, domestic fund dummy and their interaction with a taper tantrum dummy. As before, we include investor j fixed effect and year-quarter t fixed effect in our regressions, and cluster the standard error by investor. When we consider fund nationality instead

of fund domicile, we use a global fund company dummy, Asia-Pacific regional fund company dummy and domestic fund company dummy.[5]

4. Empirical results

Table 3 documents the net purchases of emerging and developed Asia-Pacific economy bonds by different types of investors during the taper tantrum. Developed Asia-Pacific includes Australia, Hong Kong SAR, Japan, Korea, New Zealand and Singapore, while emerging Asia includes China, Indonesia, Malaysia, the Philippines, Thailand, Vietnam and Chinese Taipei.[6] The institutional fire sale hypothesis suggests that during the taper tantrum, mutual funds, which are subject to flow pressure, would sell more bonds while insurance, annuity and pension funds, which are not subject to flow pressure, would not sell or may even buy bonds.

The first four columns in Table 3 show the results for emerging Asian corporate and government bond purchases. Examining the interaction term between the mutual fund and taper tantrum period dummy, we find that mutual funds were net sellers of emerging Asian government bonds during the taper tantrum relative to other times. In contrast, insurance companies, annuities and pension funds were net buyers of emerging Asian government bonds during the taper tantrum relative to other times. This confirms our hypothesis that mutual funds – which are more subject to outflow pressures – would reduce their bond holdings in the relatively risky emerging Asian government bond markets, while insurance companies, annuities and pension funds – which are not subject to outflow pressures – would increase their bond holdings in these markets. The results for emerging Asian corporate bonds are in the same direction but not significant. These results suggest that the institutional fire sale hypothesis, under which fund outflows drive institutional demands for bonds, seems to be observed in more risky emerging Asian markets.

Turning to the results for developed Asia-Pacific corporate and government bonds in the last four columns of Table 3, we find that mutual funds were net buyers of developed Asia-Pacific corporate bonds during the taper tantrum, while insurance companies, annuities and pension funds were net sellers. These results suggest that mutual funds moved into safer developed Asia-Pacific corporate bonds, while insurance companies, annuities and pension funds moved out of such assets. There is no statistically significant change of bond holdings in developed Asia-Pacific government bond markets during the taper tantrum.

Table 4 shows more specifically the net purchases of foreign currency bonds (mostly in US dollars) and local currency bonds in these economies. We find that the differential bond purchase patterns reported in Table 3 primarily occurred in the foreign currency bond markets (Table 4, columns 1–8). During the taper tantrum, we find that (i) mutual funds reduced their holdings of emerging Asian foreign currency government bonds while insurance companies, annuities and pension funds

[5] In the regression analysis in Section 4, we imposed symmetry between bond purchases and sales. In the future, we may consider bond purchases and sales separately. We may also use different variables for investor inflows and investor outflows to see if there is any asymmetry.

[6] India issued bonds are not included in emerging Asia bonds since the eMAXX dataset contains predominantly India local currency bonds held by India domestic mutual funds.

increased their holdings of such bonds; and that (ii) mutual funds actually increased their purchases of developed Asia-Pacific corporate bonds, which are considered safer, while insurance companies, annuities and pension funds decreased their purchases. We do not observe any significant pattern in local currency bonds (Table 4, columns 9–12).

Turning to our next hypothesis of global retrenchment, we examine whether the geographical locations of institutional investors affect their bond purchases. In particular, we examine the net purchases of Asia-Pacific bonds by local, regional and global investors during the taper tantrum. We classify institutional investors (or funds) based on the country of domicile of the managing firm. The global retrenchment hypothesis suggests that during a crisis, investors would reach for safety and that there is retrenchment in both gross inflows by foreign investors and gross outflows by domestic investors.

Table 5 reports the results. The first six columns document the purchases of emerging Asian bonds, while the last six columns document those of developed Asia-Pacific bonds.[7] We find that global funds were net sellers of emerging Asian corporate bonds, while they were net buyers of developed Asia-Pacific corporate bonds. At the same time, local funds tended to buy emerging Asian corporate bonds. Overall, we find some evidence of global retrenchment: local funds buy risky emerging Asian bonds, and global funds sell these bonds during crises. We also find that regional funds tended to reduce their holdings of developed Asia-Pacific government and corporate bonds during the taper tantrum.

As a robustness check, we have defined country domicile in terms of the domicile of the institutional investor (or fund). In that case, we find similar results, but the coefficients are slightly smaller in absolute size and less statistically significant than those from the regressions using firm domicile.

Next, we investigate our results further by examining foreign currency vs local currency bond markets. Table 6 presents results for foreign currency bonds only. We find that regional funds tended to sell emerging Asian foreign currency government bonds. Other than that, there is no statistically significant pattern for foreign currency bond purchases of local, regional and global funds during the taper tantrum.

Table 7 shows the results for local currency bonds only. The results are broadly similar to those reported in Table 5, with some signs of global retrenchment. In emerging Asian local currency bond markets, global funds were strong sellers during the taper tantrum, while local funds bought emerging Asian corporate bonds and Asia-Pacific regional funds bought emerging Asian government bonds.

Among developed Asia-Pacific local currency bond markets, regional funds sold both corporate and government bonds, while local funds bought corporate bonds during the taper tantrum. So far, the evidence we present suggests that the global retrenchment story is applicable in Asia-Pacific bond markets, particularly relevant to local currency bonds.

In Table 8, we examine the evidence of net bond purchase patterns by focusing on different country-domiciled investors (or funds). Instead of using one dummy for each bond issuer country, we group bond issuer countries into the following three

[7] Notice that for EM country bonds, there are relatively few global funds in this sample, and we focus on local and regional funds.

categories: (i) developed countries (Australia, Europe excluding the United Kingdom (Europe ex UK), Japan, the United Kingdom and the United States)); (ii) relatively advanced Asia EMs (Chinese Taipei, Hong Kong SAR, Korea and Singapore); and (iii) Asia EMs (China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam).

Panels A, B and C show the change of bond holdings for US-, UK- and Europe ex UK- domiciled funds. These funds are considered global funds. Panel A shows that during the taper tantrum, US-domiciled funds purchased developed country corporate bonds. Panel B shows that UK-domiciled funds sold emerging Asian government bonds and purchased developed country government bonds. Panel C shows that Europe ex UK-domiciled funds sold emerging Asian government bonds and purchased developed country government bonds and relatively advanced Asia EM bonds. Overall, Panels A, B and C of Table 8 suggest that there was a strong selling pattern for emerging Asian government bonds, and strong buying for developed country government bonds among these global funds during the taper tantrum.

Panel D shows the results for Australia- and Japan-domiciled funds, while Panel E shows the results for funds domiciled in Chinese Taipei, Hong Kong SAR, Korea, Malaysia and Singapore. These are essentially Asia-Pacific regional funds. Panel D shows that Australia- and Japan-domiciled funds purchased developed country government and corporate bonds during the taper tantrum. Panel E shows that funds domiciled in other Asian economies tended to sell Asian emerging market government bonds and advanced Asian emerging market corporate bonds during the taper tantrum. Overall, Panels D and E of Table 8 suggest that Asia-Pacific regional funds exhibited similar behaviour to global funds. It should be noted that in Panel E, the coefficients on the two interaction terms involving relatively advanced Asia EMs and Asian EMs, respectively, capture the behaviour of both regional and local funds as defined in the regressions reported in Tables 5–7. In future work, we plan to investigate the behaviour of Asia-Pacific domiciled funds in their local bond markets (ie local funds) and Asia-Pacific regional markets (ie regional funds) separately.

Last, we examine how much investors shift from Asian to non-Asian bonds in their portfolios when they have inflows/outflows. To do so, we need to match the eMAXX dataset with fund flows data, which is available from Lipper. After merging the datasets, we have a final sub-sample of 1,770 funds, and almost all of them are mutual funds.

In Table 9, we examine how fund inflows may affect their holding of Asia-Pacific bonds. The dependent variable is the change in the ratio of the book-value of a specific Asia-Pacific bond held by a fund to the sum of the book value of all Asia-Pacific bonds held by the fund. The standardised flow is defined as the ratio of investor flows during a quarter to the total net assets at the beginning of the quarter.

A positive coefficient on the term means that when standardised flows increase, the share of a specific Asia-Pacific bond held by a fund out of the total Asia-Pacific bonds held by the fund increases. This indicates that when the standardised flows are positive, the share of a specific Asia-Pacific bond held by a fund out of the total Asia-Pacific bonds held by the fund increases, and that when the standardised flows are negative, the share of a specific Asia-Pacific bond held by the fund out of the total Asia-Pacific bonds held by the fund decreases.

For the interaction term, "taper period x standardised flows", a positive coefficient on the interaction term means that when standardised flows decrease, during the taper tantrum period the share of a specific Asia-Pacific bond held by a

fund out of the total Asia-Pacific bonds held by the fund decreases more than during the non-taper tantrum period. We expect a positive coefficient on the interaction term.

We find that as mutual funds faced outflows during the taper tantrum, they decreased their allocations to the holdings of corporate bonds in developed Asia-Pacific economies in both foreign and local currencies and increased their allocations to the developed Asia-Pacific local currency government bonds. Overall, the evidence seems to suggest that mutual funds facing outflow pressure tended to invest more in relatively safe assets and less in risky assets.

There is no official starting and ending dates for the taper tantrum. In all our regressions so far, we define the period as Q2–Q4 2013. We also examined results when we define the taper tantrum period more narrowly as Q2 and Q3 2013. The results are generally similar, although overall less statistically significant.

5. Conclusion

Using security-level bond holdings data from eMAXX, this paper examines the behaviour of different institutional investors in Asia-Pacific bond markets during the taper tantrum. We find that mutual funds – which are subject to outflow pressures – liquidated their bond holdings in the relatively risky emerging Asian bond markets, while insurance companies, annuities and pension funds – which are not subject to outflow pressures – bought extra bonds in these markets. We also find some evidence of global retrenchment, where local funds bought local bonds, and regional/global funds sold these bonds during the taper tantrum. Finally, we show that mutual funds tended to invest more in relatively safe assets (developed Asia-Pacific local currency government bonds) and less in relatively risky assets (developed Asia-Pacific corporate bonds).

This paper provides the following policy implications. Different types of investors in bond markets face different regulatory and economic constraints. In particular, mutual funds face investor redemptions, which is a cash flow constraint. Furthermore, mutual fund managers are averse to becoming the worst performer in their categories for fear of losing fund flows, and may further impose on themselves internal risk limits that lead to reach for safety-type behaviour during a crisis situation. In contrast, insurance companies, annuities and pension funds do not face such cash flow constraints (although admittedly insurance companies face regulatory capital constraints). Therefore, it is important that more stringent internal risk management or regulation be in place to avoid distress selling by investors facing more heavy constraints. Such stringent risk management or regulation may come with a cost during normal times when mutual funds bring in much liquidity.

During the taper tantrum, we also find that global asset managers sold emerging Asian bonds. This has generated bond price falls and additional investor redemptions. In order to mitigate the impact of such behaviour of global asset managers on bond markets, policymakers should consider fostering a truly domestic and stable institutional investor base such as domestic pension funds and insurance companies, who could act as a natural buyer of bonds when foreign investors sell and dampen market volatility during market stress.

References

Becker, B and V Ivashina (2015): "Reaching for yield in the bond market", *Journal of Finance*, vol 70, no 5, pp 1863–902.

Bodnaruk, A and M Rossi (2016): "Dual ownership, returns, and voting in mergers", *Journal of Financial Economics*, vol 120, pp 58–80.

Broner, F, T Didier, A Erce and S Schmukler (2013): "Gross capital flows: dynamics and crises", *Journal of Monetary Economics*, vol 60, pp 113–33.

Caballero, R and A Simsek (2017): "A model of fickle capital flows and retrenchment", unpublished manuscript.

Feroli, M, A Kashyap, K Schoenholtz and H S Shin (2014): Market tantrums and monetary policy, report for the 2014 US Monetary Policy Forum, 28 February.

Forbes, K and F Warnock (2012): "Capital flow waves: surges, stops, flight, and retrenchment", *Journal of International Economics*, vol 88, no 2, pp 235–51.

Giannetti, M and L Laeven (2016): Local ownership, crises, and asset prices: evidence from US mutual funds, *Review of Finance*, vol 20, no 3, pp 947–78.

Goldstein, I, H Jiang and D Ng (2017): "Investor flows and fragility in corporate bond funds", *Journal of Financial Economics*, vol 126, pp 592–613.

Karolyi, A and K McLaren (2017): "Racing to the exits: international transmissions of funding shocks during the Federal Reserve's taper experiment", *Emerging Markets Review*, vol 32 pp 96–115.

Morris, S, I Shim and H S Shin (2017): "Redemption risk and cash hoarding by asset managers", *Journal of Monetary Economics*, vol 89, pp 71–87.

Tables

Number and US dollar value of corporate bonds

By country of issuer, as of Q4 2015 Table 1A

	eMaxx universe			8,734 funds sample	
Country	Value (USD bn)	Number of bonds	Country	Value (USD bn)	Number of bonds
United States	3865.48	41826	United States	3380.04	36068
Cayman Islands	107.50	6244	Cayman Islands	85.17	5591
United Kingdom	318.99	5278	United Kingdom	245.08	4201
Canada	334.71	3500	Canada	219.16	2926
The Netherlands	147.43	2769	The Netherlands	113.93	2190
France	111.46	2627	Japan	14.13	2092
India	10.42	2541	France	79.72	2012
Japan	20.62	2317	Australia	79.10	1346
Germany	38.76	1765	Luxembourg	57.48	1285
Australia	89.62	1511	Germany	24.92	1202
Luxembourg	75.85	1508	India	4.98	1103
Norway	28.60	1489	Korea	5.41	948
China	6.63	1450	China	4.16	801
Korea	7.62	1335	Ireland	23.01	769
Sweden	29.84	1205	Italy	19.95	651
Ireland	30.88	1072	Hong Kong SAR	4.23	599
Italy	31.50	832	Switzerland	8.80	552
Others	322.20	10229	Others	248.68	6885

Sources: eMaxx; authors' calculations.

Number and US dollar value of government bonds

By country of issuer, as of Q4 2015 Table 1B

	eMaxx universe			8,734 funds sample	
Country	Value (USD bn)	Number of bonds	Country	Value (USD bn)	Number of bonds
United States	1730.12	8826	United States	1291.4	6742
Japan	80.62	1709	Japan	32.4	1593
Canada	74.90	699	Canada	25.9	421
Germany	107.17	470	Germany	44.3	315
Korea	17.81	311	Korea	13.6	260
Italy	140.03	291	Israel	11.7	210
France	63.77	265	China	3.2	199
China	3.91	254	Italy	48.0	171
Israel	13.92	250	France	24.8	170
India	22.25	227	India	18.1	141
Mexico	72.25	209	Mexico	48.4	115
Spain	46.54	136	Indonesia	30.4	101
United Kingdom	124.63	132	Spain	18.9	96
Sweden	20.41	112	United Kingdom	46.8	95
Brazil	156.98	107	Switzerland	5.3	80
Indonesia	35.20	101	Sweden	3.8	80
Switzerland	17.49	85	Hong Kong SAR	1.0	75
Others	584.60	2521	Others	408.0	2145

Sources: eMaxx; authors' calculations.

Institutional investors and managing firms that hold Asia-Pacific bonds

As of Q4 2015, full sample of funds — Table 1C

Corporate bonds			
Country of the issuer	Number of distinct bonds	Number of funds	Number of managing firms
Japan	1970	1812	450
Australia	1246	3733	837
India	949	690	279
Korea	920	1362	396
China	750	1517	458
Hong Kong SAR	494	1398	426
Singapore	338	1026	340
Malaysia	137	589	191
New Zealand	101	947	317
Thailand	70	229	128
Chinese Taipei	70	86	51
Indonesia	61	563	229
Philippines	58	354	168
Vietnam	16	64	52
Others	93	1262	614
Government bonds			
Country of the issuer	Number of distinct bonds	Number of funds	Number of managing firms
Japan	1028	805	210
Korea	217	850	250
China	144	262	138
India	110	371	138
Indonesia	100	990	301
Philippines	72	573	230
Hong Kong SAR	71	33	28
Australia	52	754	207
Malaysia	49	414	154
Singapore	36	411	122
Thailand	36	251	132
Chinese Taipei	23	22	16
New Zealand	21	448	198
Vietnam	16	211	123
Others	142	1659	747

Sources: eMaxx; authors' calculations.

Descriptive statistics

Table 2

Full sample	N	Max	Min	Mean	Std. Dev	25th	Median	75th
Change in bond holdings	5,241,000	366,986	–286,106	122	5,013	0	0	1
Par amount of bond holdings	5,159,000	7,465,000	0	2,151	18,154	3	92	1,000
Matched sample	**N**	**Max**	**Min**	**Mean**	**Std. Dev**	**25th**	**Median**	**75th**
Change in bond holdings	519,920	296,989	–243,700	185.9	7,077	–1	0	1
Change in bond holding *i* / total holdings of Asia-Pacific bonds	518,246	100	–2,079	0	10	-0.017	0	0.043
Fund flows / total net assets	457,466	56,109	–36,283	0	488	-0.051	0	0.046
Fund flows	458,429	14,848	–11,999	–4	205	–4	0	2
Par amount of bond holdings	518,891	2,191,000	0	2842	21,569	1	141	1,448
Total holdings of Asia-Pacific bonds	519,920	1,780,0000	0	206370	842,245	2119	12,357	68,859

Notes: The full sample contains 8,374 funds and the matched sample 1,770 funds. Par amount of bond holdings and change in bond holdings are in thousands of US dollars. Fund flows are in millions of US dollars.

Sources: eMaxx; authors' calculations.

Change of bond holdings by type of investors during the taper tantrum

Table 3

	Emerging Asia				Developed Asia			
	Corporate		Government		Corporate		Government	
Taper period x MF	–134.886		–203.341***		80.411**		141.538	
	(168.925)		(74.326)		(38.602)		(98.458)	
Taper period x Ins/Ann/PF		138.574		204.424***		–82.730**		–105.691
		(168.794)		(74.682)		(39.271)		(112.607)
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO
Observations	176,090	176,090	197,808	197,808	1,089,312	1,089,312	1,052,552	1,052,552
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared overall	0.157	0.157	0.0319	0.0319	0.0269	0.0269	0.0582	0.0582

MF = Mutual funds. Ins/Ann/PF = Insurance/Annuity/Pension funds.

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Change of bond holdings by type of investors during the taper tantrum

In foreign and local currencies

Table 4

	Foreign currency								Local currency			
	Emerging Asia				Developed Asia				Emerging Asia		Developed Asia	
	Corporate		Government		Corporate		Government		Corp	Gov	Corp	Gov
Taper period x MF	–36.911		–116.804*		174.477***		23.163		–165.259	–93.184	–219.654	86.670
	(54.551)		(66.206)		(39.768)		(117.836)		(431.775)	(163.683)	(257.540)	(153.518)
Taper period x Ins/Ann/PF		37.074		118.102*		–176.061***		–23.764				
		(54.597)		(66.392)		(40.067)		(117.870)				
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Observations	114,922	114,922	89,220	89,220	661,964	661,964	45,392	45,392	61,168	108,588	427,348	1,007,160
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared overall	0.0209	0.0209	0.0256	0.0256	0.0267	0.0267	0.0449	0.0449	0.186	0.0505	0.0391	0.0729

MF = Mutual funds. Ins/Ann/PF = Insurance/Annuity/Pension funds.

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Change of bond holdings by global, regional and local funds during the taper tantrum

Table 5

	Emerging Asia						Developed Asia					
	Corporate			Government			Corporate			Government		
Taper period x local firm	578.953***			–220.764			36.318			–51.255		
	(221.529)			(331.996)			(26.053)			(95.380)		
Taper period x regional firm		189.212			73.943			–285.400**			–181.613**	
		(198.124)			(73.148)			(128.312)			(82.178)	
Taper period x global firm			-552.911**			–66.866			72.509**			135.622
			(266.737)			(76.002)			(33.702)			(145.359)
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Observations	187,867	187,867	187,867	210,930	210,930	210,930	1,146,116	1,146,116	1,146,116	1,102,413	1,102,413	1,102,413
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared overall	0.158	0.158	0.158	0.0340	0.0340	0.0340	0.0250	0.0251	0.0250	0.0594	0.0594	0.0594

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Change of bond holdings by global, regional and local funds during the taper tantrum

In foreign currencies

Table 6

	Emerging Asia						Developed Asia					
	Corporate			Government			Corporate			Government		
Taper period x local firm	38.729			117.543			75.608			–420.140		
	(45.672)			(155.188)			(114.276)			(428.704)		
Taper period x regional firm		30.122			–157.533*			–59.744			–124.108	
		(116.587)			(92.508)			(91.567)			(180.505)	
Taper period x global firm			–76.150			125.681			–11.643			185.142
			(105.706)			(84.669)			(77.636)			(163.587)
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Observations	124,254	124,254	124,254	94,520	94,520	94,520	699,159	699,159	699,159	47,009	47,009	47,009
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared overall	0.0183	0.0183	0.0183	0.0242	0.0243	0.0243	0.0234	0.0234	0.0234	0.0433	0.0433	0.0433

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Change of bond holdings by global, regional and local funds during the taper tantrum

In local currency

Table 7

	Emerging Asia						Developed Asia					
	Corporate			Government			Corporate			Government		
Taper period x local firm	1,585.423*			–103.027			420.947***			–70.118		
	(869.854)			(403.564)			(109.224)			(100.886)		
Taper period x regional firm		452.729			326.478***			–971.591***			–177.337**	
		(450.426)			(116.067)			(333.816)			(83.843)	
Taper period x global firm			–2,462.394*			–335.318***			–39.952			174.054
			(1,473.178)			(125.401)			(94.082)			(163.848)
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Observations	63,613	63,613	63,613	116,410	116,410	116,410	446,957	446,957	446,957	1,055,404	1,055,404	1,055,404
Within R-squared	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-squared overall	0.189	0.188	0.190	0.0523	0.0523	0.0523	0.0389	0.0390	0.0387	0.0738	0.0738	0.0738

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Global retrenchment: evidence from US-domiciled funds

Table 8A

	All bonds	Corporate bonds	Government bonds
Developed country bonds	164.128***	94.849***	970.574***
	(13.478)	(9.919)	(98.346)
Advanced Asian EM bonds	187.514***	83.495***	599.408***
	(42.244)	(17.794)	(173.346)
Asian EM bonds	213.120***	367.867**	–22.370
	(59.054)	(168.079)	(59.890)
Taper tantrum x developed country bonds	41.427***	42.500***	34.933
	(14.176)	(11.328)	(86.121)
Taper tantrum x advanced Asian EM bonds	–5.604	–22.647	27.903
	(75.209)	(29.093)	(343.569)
Taper tantrum x Asian EM bonds	–17.889	–19.563	–75.489
	(53.574)	(144.931)	(99.458)
Fund fixed effects	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES
Bond fixed effects	NO	NO	NO
Observations	19,368,716	17,294,822	2,073,894
Within R-squared	0.000	0.000	0.001
R-squared overall	0.00629	0.00733	0.0148

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Global retrenchment: evidence from UK-domiciled funds

Table 8B

	All bonds	Corporate bonds	Government bonds
Developed country bonds	69.744***	71.017***	253.215**
	(15.468)	(12.850)	(127.065)
Advanced Asian EM bonds	125.632***	38.225***	275.590**
	(39.229)	(13.660)	(130.045)
Asian EM bonds	57.236*	86.189**	–75.332
	(33.485)	(43.142)	(83.182)
Taper tantrum x developed country bonds	24.704	–13.020	197.118*
	(21.060)	(19.358)	(101.378)
Taper tantrum x advanced Asian EM bonds	–90.893	18.044	–225.168
	(58.285)	(38.124)	(143.146)
Taper tantrum x Asian EM bonds	–146.080**	12.950	–210.496**
	(58.834)	(77.080)	(91.482)
Fund fixed effects	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES
Bond fixed effects	NO	NO	NO
Observations	1,304,498	1,114,085	190,413
Within R-squared	0.000	0.000	0.000
R-squared overall	0.00646	0.0125	0.0139

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Global retrenchment: evidence from Europe-domiciled funds

Table 8C

	All bonds	Corporate bonds	Government bonds
Developed country bonds	50.210**	33.455***	283.945***
	(19.754)	(7.257)	(63.970)
Advanced Asian EM bonds	75.033**	18.443*	360.677**
	(38.171)	(10.858)	(154.888)
Asian EM bonds	108.088*	273.076*	–113.129
	(59.049)	(141.382)	(80.892)
Taper tantrum x developed country bonds	32.072	9.122	138.252*
	(33.770)	(16.683)	(82.179)
Taper tantrum x advanced Asian EM bonds	106.880**	29.134	315.844
	(49.489)	(26.480)	(208.022)
Taper tantrum x Asian EM bonds	–242.979***	–196.623	–335.256***
	(81.879)	(145.762)	(104.317)
Fund fixed effects	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES
Bond fixed effects	NO	NO	NO
Observations	6,551,408	5,132,068	1,419,340
Within R-squared	0.000	0.000	0.000
R-squared overall	0.0149	0.0177	0.0238

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Global retrenchment: evidence from Australia- and Japan-domiciled funds

Table 8D

	All bonds	Corporate bonds	Government bonds
Developed country bonds	–28.378**	–31.896*	–24.036**
	(12.028)	(18.596)	(11.734)
Advanced Asian EM bonds	–1.018	–16.743	3.242
	(8.006)	(24.518)	(6.561)
Asian EM bonds	0.660	109.216*	–19.527
	(10.767)	(57.012)	(12.268)
Taper tantrum x developed country bonds	74.368**	127.790*	53.676*
	(32.438)	(68.492)	(32.481)
Taper tantrum x advanced Asian EM bonds	11.013	17.569	12.544
	(24.479)	(50.290)	(21.924)
Taper tantrum x Asian EM bonds	–23.949	–74.193	–19.900
	(45.089)	(202.344)	(34.579)
Fund fixed effects	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES
Bond fixed effects	NO	NO	NO
Observations	3,549,299	1,010,818	2,538,481
Within R-squared	0.000	0.000	0.000
R-squared overall	0.00358	0.00253	0.00481

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Global retrenchment: evidence from HK- KR- SG- TW- and MY-domiciled funds Table 8E

	All bonds	Corporate bonds	Government bonds
Developed country bonds	–30.056	–69.683***	59.168
	(23.810)	(26.639)	(43.244)
Advanced Asian EM bonds	57.900*	30.941	115.274***
	(29.601)	(37.658)	(34.435)
Asian EM bonds	41.014***	2.801	131.263***
	(15.448)	(21.395)	(27.776)
Taper tantrum x developed country bonds	–19.948	46.801	–234.430
	(79.735)	(98.818)	(153.642)
Taper tantrum x advanced Asian EM bonds	–156.561*	–241.768**	–20.707
	(81.459)	(112.868)	(118.241)
Taper tantrum x Asian EM bonds	–74.452*	8.311	–303.070***
	(41.255)	(55.153)	(79.043)
Fund fixed effects	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES
Bond fixed effects	NO	NO	NO
Observations	177,744	119,552	58,192
Within R-squared	0.000	0.000	0.000
R-squared overall	0.0150	0.0242	0.0314

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.

Impact of investor flows on Asia-Pacific bond holdings

Table 9

	Foreign currency				Local currency			
	Emerging Asia		Developed Asia		Emerging Asia		Developed Asia	
	Corporate	Government	Corporate	Government	Corporate	Government	Corporate	Government
Standardised flow	0.0217	–0.0145***	–0.0518**	–0.0840***	–0.0237	–0.0715***	–0.0031***	0.1419***
	(0.0338)	(0.0044)	(0.0211)	(0.0084)	(0.0239)	(0.0207)	(0.0009)	(0.0427)
Taper period x standardised flow	–0.0730	5.1028	0.0465**	–0.3699	4.3363	–1.3018	0.0314***	–0.2080***
	(0.0457)	(5.0731)	(0.0211)	(1.8172)	(3.2128)	(3.3000)	(0.0026)	(0.0501)
Fund fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year-quarter fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Bond fixed effects	NO	NO	NO	NO	NO	NO	NO	NO
Observations	24,163	21,521	97,986	8,468	7,515	25,155	89,135	176,873
Within R-squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
R-squared overall	0.165	0.138	0.121	0.124	0.0708	0.0521	0.0790	0.0595

Using the matched sample of 1,770 funds.

Numbers in brackets are standard errors, clustered by investor. ***, ** and * denote the significance levels of 1%, 5% and 10%, respectively.