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of the ECB's Asset Purchase Programme

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Abstract

We explore the transmission of the ECB's public sector asset purchase programme (PSPP) via the portfolio rebalancing of investment funds and their investors. Evidence for this channel would validate several theoretical propositions and may help in fine tuning the programme. Using dynamic panel methods to identify significant rebalancing, we find that PSPP-holding funds reduce their holdings of government bonds and rebalance towards bonds issued by deposit taking corporations - but only after the scaling-up of purchases in March 2016. Deeper analysis shows that the purchased assets are predominantly issued outside the euro area. Non-PSPP-holding funds also tend to rebalance towards non-EA issued government bonds and those issued by non-financial corporations. We find no evidence of rebalancing towards equities or derivatives. Investment flows are found to be a catalyst for the rebalancing undertaken by funds themselves. Funds with significant redemptions do relatively more rebalancing of their portfolios. Overall, our results suggest that the programme currently operates through purchases of foreign assets. The scaling-up of the operation is closely aligned with the statistical significance of its effects.

JEL Codes: G15,G23,G28
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Non-Technical Summary

The Eurosystem began its Extended Asset Purchase Programme (EAPP) in March 2015. This policy became necessary when other non-standard measures failed to shift inflation expectations. There are several transmission mechanisms through which asset purchases are expected to lead to inflation. This paper assesses the effectiveness of one of these mechanisms - the *portfolio rebalancing channel*. This works by reducing the public supply of mainly government bonds. In efficient markets, changes in expectations about the future availability of an asset will cause market price to jump immediately to a level that leaves no foreseeable arbitrage opportunities to exploit. As described by D'Amico et al. (2012), in addition to the announcement price-impact, there will also be smooth price movements through time so that investors are adequately rewarded for holding such assets temporarily until they are actually purchased by the ECB/Eurosystem. Overall, the price rises at announcement, and those that follow, depress yields and reduce the cost of borrowing in all the affected markets. This occurs through either a benchmarking effect or, more directly, by increasing the demand for new issues of debt and equity and improving the conditions at which market-based financing can be obtained.

A broad literature already considers the price-impact of asset purchase programmes (see, Schlepper et al. (2017)). In this paper we examine changes in portfolio composition of investment funds (and the redemption and issuance of fund units) to identify which asset markets were most affected by the redistribution of private investment during the recent large-scale programme of asset purchases. Our analysis is therefore more direct than most of the existing literature which focuses on financial flows of broad sectors of the economy. Since we have individual fund level information we can obtain insights about rebalancing choices by asset, currency and maturity. This delivers more precise evidence on the the beneficial effects of EAPP than is apparent in the extant literature (e.g. by Koijen et al. (2016) and Albertazzi et al. (2016)).

We employ a dynamic panel regression approach to uncover the statistical evidence of a relationship between programme activity and funds' proportional net-purchases of different asset categories (as well as redemptions and issuances of fund units). This methodology takes advantage of the large cross-sectional sample of funds controlling for individual differences that are unrelated to the EAPP programme. It also circumvents violations of classical regression conditions required to deliver unbiased estimates of effects. In addition, by focusing on net purchases we avoid confusing *passive* re-composition of portfolios due to valuation changes with *active* rebalancing. We also control for the fundamental determinants of rebalancing associated with fluctuations in macroeconomic variables.

Our results provide evidence of significant rebalancing towards bonds issued by deposit taking corporations but only after the pace of purchases was raised from 60 to 80 bln euro per month. We find that investors rebalance away from funds focused on holding the assets targeted by the purchase programme. In terms of the maturities and currencies of newly purchased assets; we observe a move away from assets denominated in euro and into either very short term euro area government bonds outside the PSPP eligible set or long term non-PSPP fixed income assets. We find little evidence of a rebalancing towards equities.

1 Introduction

We extend and deepen the extant analysis of the effects of the Eurosystem's Extended Asset Purchase Programme (EAPP) by examining the portfolio rebalancing of investment funds and, indirectly, the behaviour of fund investors responsible for the investment flows that determine redemption and issuance of fund units. This adds to the analysis of EAPP by Koijen et al. (2016) and Albertazzi et al. (2016) who consider investment fund sector flows within a financial accounts framework. It also generalises the work of Joyce et al. (2011) beyond their focus on the behaviour of individual Insurance Companies and Pension Funds (ICPF) in response to UK Quantitative Easing. We identify the funds that hold assets targeted for purchasing by the Eurosystem and we examine their subsequent purchases/sales. Using a micro-panel econometric methodology we identify how fund characteristics affect the heterogeneity of rebalancing behaviour during the programme.

Our analysis is distinctly different from that of Koijen et al. (2016) and Albertazzi et al. (2016) in the following respects. Firstly, we focus on actual portfolio choices of individual funds rather than on broad financial accounts sectors. This allows for a detailed analysis of behaviour taking account of heterogeneity by fund and asset characteristics. Secondly, we examine the net purchases of assets by funds as well as the value of their holdings so it is possible to identify rebalancing behaviour as distinct from valuation changes (this was not possible, for example, in the analysis of Joyce et al. (2011)). Since funds can be heavily mandated to hold certain types of assets, we also explore whether some of the adjustment to the asset purchase programme is shared by fund investors. This is achieved through an analysis of redemptions and issues. We identify those funds that are most affected by the programme using the ISIN codes of their asset holdings. The detailed information about the strategies of funds in our sample also helps us to disregard funds that do not have the flexibility to adjust in response to the programme (e.g., ETFs and index trackers). The analysis of this detailed data should enable an identification of portfolio rebalancing effects if they in fact exist.

There are several channels through which the asset purchases are understood to transmit to economic effects. Some channels are common to standard and non-standard policies but some are more distinctly associated with asset purchases. For example, the portfolio rebalancing and liquidity channels are specific, if not unique, to asset purchase programmes. The distinction between the transmission mechanisms for both types of policy blurs when one considers channels such as signalling and the making of commitments to a future policy stance. The signalling of future monetary policy commitments through asset purchases is an important channel for its transmission (see, for example, Eggertsson and Woodford (2003)). By buying long term bonds the central bank demonstrates its commitment to lower rates for longer. This should lead to a lengthening in the maturity profile of public and private debt issuance. Portfolio rebalancing effects in the context of strongly preferred habitats (see Vayanos and Vila (2009)) should accentuate any downward pressure on the term premium due to programme purchases. Substitution to other asset classes raises the prospect of more issuance and other real effects that have been outlined by Krishnamurthy and Vissing-Jorgensen (2011). The consequent improvement in fiscal sustainability should in turn lower risk premiums and this should improve growth and inflation prospects more widely. An

alternative view is that the purchase programme (in conjunction with other ECB initiatives such as lending operations and Outright Monetary Transactions) might reduce incentives to make structural reforms within the banking sector and in fiscal policy. This may contribute to lower expected long-term growth and increased future instability.

In addition to historically low bond yields the EAPP has driven equity markets to higher levels (although, the latter seem to be due mainly to increased risk appetite and lower discount rates as there is little evidence of expected improvements in earnings/dividends see, Box 2, ECB (2015)). This may pose a problem if the programme is terminated in an unexpected way or with unexpected timing. Financial stability concerns emerge (and a risk channel arises) if the programme encourages holders to switch to high risk assets and greater leverage as in Woodford (2011) and Coimbra and Rey (2016), as well in taking on more liquidity risk as described by Stein (2012). The theoretical work of Brunnermeier and Sannikov (2014) outlines more specific mechanisms for the transmission of such risks. Valiante (2015) also mentions the effects of the purchases on liquidity and financial plumbing. Our analysis throws light on the risk channel mainly through maturity effects.

Portfolio rebalancing away from EA assets and into foreign issued assets may produce beneficial effects through an exchange rate channel. Demertzis and Wolff (2016) suggest that there has been a strong effect from asset purchases on the value of the euro. A January 2017 report, Bundesbank (2017), also contributes evidence of such effects but concludes that they do not go significantly beyond the announcement effects of the programme. The bulletin also highlights the fact that exchange rate effects are very difficult to disentangle from the effects of other monetary policy actions (e.g. changes in the rate earned on funds at the deposit facility), complex market expectations adjustments in response to signalling and policy initiatives outside the EA (e.g. tightening in the US). The current analysis does not attempt to disentangle these effects but provides direct evidence of the movement into foreign assets.

An important point made by Valiante (2015) is that the low interest rate environment (and Quantitative Easing itself) has produced an environment which is challenging for bank profitability. This may explain why it is difficult to uncover evidence of the bank lending channel for such purchases (see, for example, Bergant (2017)). The constraints on banks opens the way for the non-bank sector to expand. But this is a sector that is not as well understood – and not as well regulated – as the traditional banking sector. This is therefore another good reason to obtain insights about the portfolio rebalancing of investment funds. And since investment funds tend to be quite constrained by their advertised strategies and mandates while their investors can be more flexible, we regard an analysis of redemptions and issues of new investment fund units (in addition to the intra-fund rebalancing) as crucial to gaining an understanding of the broader effects of the programme.

We employ a dynamic panel regression approach taking full advantage of the large cross-sectional sample of funds while controlling for individual differences that are unrelated to the EAPP programme. This methodology circumvents violations of classical regression conditions required to deliver unbiased estimates of effects. In addition, by focusing on net purchases we avoid confusing *passive* re-composition of portfolios due to valuation changes with *active* rebalancing. We also control for the fundamen-

tal determinants of rebalancing associated with fluctuations in macroeconomic variables.

Our results provide evidence of significant rebalancing towards bonds issued by deposit taking corporations but only after the pace of purchases was raised from 60 to 80 bln euro per month. We find that investors rebalance away from funds focused on holding the assets targeted by the purchase programme (in the case of EA Government bonds there is a move into shorter maturities - those not eligible for purchase under the EAPP). In terms of the maturities and currencies of newly purchased assets; we observe a move into non-PSPP assets with longer maturities, away from assets denominated in euro and into foreign issued fixed-income assets. We find little evidence of a rebalancing towards equities. The absence of exchange rate effects (except at the time of the announcement of the programme) detracts somewhat from the likelihood that imported inflation was triggered by portfolio rebalancing.

The paper is organised as follows. In the following two sections we discuss the modalities and operation of the purchase programme so far and consider related literature. This is followed by a detailed discussion of the econometric specification we use to identify effects of the purchase programme. We then consider the data and results. This is followed by a discussion of robustness analysis and conclusions.

2   The Extended Asset Purchase Programme So-Far

The Eurosystem's Extended Asset Purchase Programme was announced on 22 Jan 2015. The announcement was, to some extent, expected since normal policy tools (and some non-standard measures) had already reached the limits of their effectiveness. By the end of 2014 the ECB had only managed to purchase €30bln of assets under the auspices of the Asset Backed Securities Programme (ABSPP) and the 3rd Covered Bond Purchase Programme (CBPP3) with relatively little impact on new issuance. Similarly, Targeted Long Term Refinancing Operations (TLTROs) had attracted limited interest from banks preoccupied with restructuring balance sheets to meet regulatory requirements and with depressed lending opportunities. Over 50% of the first two TLTRO operations had already been repaid early and this was expected to be a feature of the later operations. Macroeconomic conditions had also remained subdued and actual and expected inflation were well below target. The headline rate of inflation had remained stubbornly below 1% throughout 2014, and reached a low of 0.3% in November (0.7% if energy and food were excluded).

So conditions were ripe for a further extension of non-standard measures into a full-blown quantitative easing programme through direct purchases of assets. The main component of this has been the public sector purchase programme (PSPP). At the time of the initial announcement the Eurosystem made a commitment to purchase more than €1 trillion of securities over an 18 month period. In December 2015 the termination date of the programme was extended from September 2016 to March 2017 and more assets were included in the purchasable category (i.e. regional and local government bonds). In March 2016 the size of the programme was scaled up from €60bln to €80bln per month. These changes were combined with two adjustments in the deposit facility rate (firstly, in December 2015 to -30bps and then in March 2016 to

-40bps) which also broadened the universe of assets that could be bought.

The programme was further extended to include investment grade corporate bonds in March 2016. By the end of 2016 the Eurosystem's balance sheet contained €1,654bln of assets for monetary policy purposes and this included a €105bln legacy from the Securities Markets Programme (specifically, government bonds issued by Greece, Ireland Italy Portugal and Spain).[1] By the end of April 2017 the ECB had purchased about €1.5 trillion under the PSPP component of the EAPP. Approximately €1.3 trillion of this consists of national government and agency bonds (see Figure 1). The ABS and CBPP3 elements remain small at roughly €24 and €216bln by the end of April 2017.

In terms of the modalities of the programme the PSPP is split between Government (central and local) and Supranational in an 88% to 12% ratio. The capital key is used to target interventions across the issuer countries. This implies that countries with large GDP, large populations and smaller national debt levels are disproportionately affected by the purchases relative to outstanding debt. Bonds purchased must be BBB or better (i.e. at least investment grade) with maturities between 2 and 30 years. Purchases cannot exceed 33% of the outstanding issued debt of a sovereign and cannot exceed 25% of a particular issue. A condition applied to purchases, until its removal in December 2016, was that the yield-to-maturity of the purchased assets had to exceed the ECB's deposit facility rate at the time of purchase.

3 Literature

Much of the empirical research on the effects of asset purchases by central banks has focused on the immediate price effects (see, Joyce and Tonks (2012), Haldane et al. (2016), Gagnon et al. (2010) and Gagnon et al. (2011), D'Amico et al. (2012), D'Amico and King (2015), Christensen and Rudebusch (2012), Andrade et al. (2016), Altavilla et al. (2015) and Eser and Schwaab (2016)). The exchange rate effects are examined by Glick and Leduc (2013). Volatility effects of QE have been analysed by Bollerslev et al. (2009) while equity price effects and corporate bond spreads are examined in Benford et al. (2009). The wider macroeconomic effects have been analysed by, for example, Weale and Wieladek (2014), Baumeister and Benati (2013) and Engen et al. (2015).

There are relatively few papers that have tried to get insights into the portfolio rebalancing process by looking directly at the portfolio allocation decisions of financial intermediaries. Most portfolio rebalancing studies focus on flow-of-funds (financial accounts) within which sectors, including the investment funds category, can be analysed (e.g. Carpenter et al. (2013) and Hogen and Saito (2015)). Joyce et al. (2015) extend such an analysis to explore the heterogeneous impact of QE on insurance companies and pension funds based on funds characteristics.

Carpenter et al. (2015) finds that sellers to the Federal Reserve were mainly households and other non-bank financial institutions comprising hedge funds, broker deal-

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[1]The SMP was terminated on 6th September 2012 at the same time that technical features of Outright Monetary Transactions (OMT) measures were announced. SMP securities are held until maturity and the outstanding stock from this programme declined due to redemptions at a rate of about €20bln per year.

ers and insurance companies. Those who sold to the Fed subsequently purchased corporate bonds. Hogen and Saito (2015) find that Japanese banks and foreign investors were the largest sellers of government bonds to the Bank of Japan and portfolio rebalancing towards bank loans, equity securities and corporate bonds resulted. The micro-level analysis of Joyce et al. (2015) indicates that sales of UK Gilts to the Bank of England by UK insurance companies and pension funds gave rise to reinvestment in corporate bonds. It is worth mentioning that Joyce et al. (2015) do not possess the transactions data for the ICPF entities and rely on the change in value of the holdings. They could therefore be identifying a valuation effect rather than a change in portfolio composition.

Two recent papers on portfolio rebalancing as a result of the ECB's Extended asset Purchase Programme include Koijen et al. (2016) and Albertazzi et al. (2016). In Koijen et al. (2016) the effects of the EAPP have been analysed for broad sectors by using the holdings data of households and institutional investors. Their results so-far only pertain to the period from 2013Q4 to 2015Q4. They examine how rebalancing of portfolios affects risk and duration exposures. They assume that economic conditions help agents to anticipate the introduction of the programme. An IV method is therefore proposed to identify exogeneous effects of the programme using the fact that the programme is heterogeneously applied relative to outstanding supplies across euro area countries. The heterogeneity in the application of the programme across countries according to the capital key identifies the effects of the intervention quantity and they use the imbalance in the interventions across maturities to examine within country variation (this leads to a low frequency difference-in-difference approach for the identification of the programme effects).

They find that there is a strong home bias in holdings of PSPP assets by vulnerable countries for all sectors (this is similar to findings by Hau and Lai (2016)). Banks in vulnerable countries are therefore disproportionately exposed to sovereign risk. The significant results concerning responses to the EAPP purchases can be described as follows; (i) foreign holders were most elastic in their response to the programme, (ii) the ECB buys 1.5% of duration risk each month and reduces risk mismatch, (iii) there has been a large reduction in debt issuance by banks in the euro area - such bonds were held by foreign and vulnerable-country banks, (iv) the impact on EAPP asset prices has been 13bps but with a lot of heterogeneity across country of issuance and maturities. Our analysis is not as wide ranging as theirs but it concerns a more detailed examination at a micro-level where cross holdings are less likely to confound the results.

Albertazzi et al. (2016) examine the portfolio rebalancing of broad sectors (based on national financial accounts sectors) using an identification based on the size of the valuation increase experienced at the start of the EAPP. They assume that the incentive to rebalance is commensurate with the incentive to search for yield.The valuation gains experienced by the different sectors (assumed to be due to asset purchases) varies from about 2% to 4%. In the regression exercise, the weight of specific securities in sectoral portfolios is interacted with the price change of the security and this is, in turn, interacted with a dummy for the post-EAPP implementation period. Investor rebalancing behaviour is assumed to be associated with yield-to-maturity or other risk characteristics of the securities. The use of security-by-security and holder fixed effects allows for the avoidance of an endogeneity issue if a related credit channel is at work explaining the increased issuance of liabilities or an increased demand for credit by particular

firms. They focus some attention on newly-issued debt securities. This is warranted in their analysis because there must be equality in the rebalancing across investor groupings when the full population of investors is examined (one could argue that there is a need to account for redemptions too). Albertazzi et al. (2016) also consider the change in risk (measured by ratings and residual maturity). They compare the effects of EAPP across vulnerable and less vulnerable euro area countries. They also examine bank lending as one type of portfolio rebalancing. For newly issued securities they only find significant rebalancing effects for vulnerable countries. In general they find very limited evidence of the rebalancing channel.

In our analysis, the question addressed is a bit different from Albertazzi et al. (2016). We examine how the portfolios of one sector (investment funds) domiciled in one country have adjusted when the supply of one asset class is expected to be subtracted at a known pace from the gross asset holdings of the private sector. There is a wide variety of assets that are not accounted for by the portfolios we examine (i.e. we don't have the entire universe of assets in our study and we do not have the entire population of investors). Since the value of many assets continually fluctuates, funds will rebalance portfolios to adjust their *ex ante* exposures. Also, since values depend on the discounted value of returns - and these have quite variable fundamental determinants - is possible to have large valuation changes within a sector portfolio that is unrelated to the supply of securities in circulation. In this context unanticipated losses on existing holdings will often be a primary determinant of future rebalancing behaviour. Such confounding effects are, for example, likely to pervade the analysis of Albertazzi et al. (2016). Our approach avoids much of this spurious effect by focusing on net purchases. We also control for the fundamental determinants of valuation associated with fluctuations in macro variables. These are now outlined as part of our modelling approach.

4 Model

Our aim is to examine how the ECB's quantitative easing (QE) policy affected the within sector rebalancing of IFs. To this end, we focus on three different dimensions of portfolio composition and we allow for heterogeneities in the response to QE amongst different types of funds according to a broad set of fund characteristics.

We estimate the following panel regressions;

$$
\begin{aligned}
x_{it} = \alpha_i &+ \gamma x_{it-1} \\
&+\phi_1 QE\_antic + \phi_2 QE\_first + \phi_3 QE\_second \\
&+\beta_1 Debt\_net_t + \beta_2 fin\_control_{jt} \\
&+\epsilon_{it}
\end{aligned}
\tag{1}
$$

$$x_{it} = \alpha_i + \gamma x_{it-1}$$
$$+\phi_1 QE\_antic + \phi_2 QE\_first + \phi_3 QE\_second$$
$$+\delta_1 QE\_antic * Fund\_charact_{jit}$$
$$+\delta_2 QE\_first * Fund\_charact_{jit}$$
$$+\delta_3 QE\_second * Fund\_charact_{jit} \quad\quad (2)$$
$$+\beta_1 Debt\_net_t + \beta_2 fin\_control_{jt}$$
$$+\beta_3 Fund\_charact_{jit}$$
$$+\epsilon_{it}$$

where, the dependent variable is the portfolio proportion of some *asset class* stated in percentage points for each investment fund i and for quarter t. The assets are categorised into subsets along three dimensions of portfolio composition: 1) 'Type and/or Issuer' of the asset; 2) 'Original Maturity' of the asset; and 3) 'Currency of Denomination' of the asset at the time of issue. The first of these broad categories is further sub-divided into: cash, equity issued by deposit taking corporations, equity issued by other institutions, derivatives, security borrowing, overdrafts, other assets, bonds issued by governments, bonds issued by deposit taking corporations, bonds issued by non-financial corporations, bonds issued by MMFs, IFs or FVCs, and bonds issued by other entities not already mentioned. The 'Original Maturity' category is sub-divided into: assets with term-to-maturity less than one year, assets with term-to-maturity between one and two years, assets with term-to-maturity greater than two years and assets with no planned term-to-maturity. For the final broad category, 'Currency of Denomination', we sub-divide into the three main currencies: USD, Euro and GBP.

To obtain a comprehensive overview of the dynamics of portfolio composition we examine both the end-quarter stock positions and the within-quarter flows (i.e. transactions / net purchases expressed as % of total assets) for each asset class. The stock position is subject to revaluation effects and these tend to dominate the rebalancing effects. Purchases and sales of assets are recorded at market value at the time of the transactions so we can rely on the difference between gross buy and sell transactions to reflect portfolio rebalancing net of revaluations.[2]

In the first regression, we relate the portfolio rebalancing variable to QE dummy variables, namely, QE_Antic, QE_First, and QE_Second. These dummy variables select the following time periods respectively for which QE effects (or the effects of its anticipation) are estimated; 2014q4, from 2015q1 to 2016q1, and from 2016q2 to 2016q3 respectively.[3] Following the work by Joyce et al. (2015) and Carpenter et al. (2013) and to control for non-QE macroeconomic contributors to portfolio rebalancing as well as supply-side effects of new issuances, we include the following explanatory variables in the regressions; (a) the net issuance of debt in the Euro Area in billion ($Debt\_net$) and

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[2]In particular the stock is the share of asset class x that the fund i invests at the end of period t over total asset of fund i at the end of period t. The flow is the share of net transactions for asset class x at the end of period t for fund i over total asset at the *beginning* of period t for fund i . Net transactions are the market value of purchases and sales of a security on the dates of each transaction. A purchase implies an increase in the position and sales imply a decrease in the position. Short selling a security is a decrease in position (i.e. sale).

[3]Recall, the combined monthly purchases of private and public securities consisted of 60 billion euro from March 2015 up until March 2016. Starting in April 2016 the monthly purchase increased to €80 billion on average.

(b) the following list of macroeconomic controls (collectively denoted $fin\_control_{jt}$): the US 10 year treasury yield adjusted to constant maturity (US_long_yield), the 10 year corporate spread ($us\_corp\_spread2$), and the VIX (us_vix_vol).

In the second regression, we add the interaction of QE variables with specific fund characteristics ($Fund\_charact_{it}$) which are: investor withdrawals relative to beginning of period NAV ($redeem\_NAV$) and investment inflows relative to beginning of period NAV ($issuance\_NAV$) , the fund leverage as a proportion of NAV ($leverage\_nav$) and the average of sales and purchases of securities relative to NAV ($turnover\_nav$).[4]

We retain for analysis only those funds that are actively managed and we exclude those funds that have a daily turnover relative to net asset value in excess of 17 percent. This is to avoid the inclusion of funds that engage in high-frequency trading.[5] In order to ease the interpretation of the results, all the variables are centered around the pre-QE period average (2014 Q1 - 2014 Q3).[6]

Given that our dependent variables are serially correlated, we include a lagged dependent variable in our regression and this leads naturally to estimation of a dynamic panel. We employ the dynamic panel methods pioneered by Holtz-Eakin et al. (1988) and further developed by Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), Windmeijer (2005), Baum et al. (2003) and Bai and Ng (1995). Specifically, we use an Arellano-Bond/Arellano-Bover dynamic panel which is a *difference* generalised method of moments (DGMM) where the individual fund fixed effect is purged using orthogonal deviation and the lagged level variables are used to instrument the transformed equation.[7] All individual funds characteristics and the lagged values of the dependent variable are considered endogenous and are instrumented with their second and third lags. QE variables and the foreign financial variables are considered strictly exogenous.[8]

The above model is applied to two different sub-samples of investment funds based on whether or not they have held a significant fraction of their portfolio in the form of PSPP assets. Specifically, we denote funds as *PSPP-holders* if they have, in any quarter of our sample, held at least 10 percent of their portfolio in PSPP assets bought by the

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[4]We also try to interact the following fund characteristics which however were not significant. Size in Euro billions (based on NAV) ($size$), closing position of asset denominated in currency other than reporting currency as a share of total assets (closing position) ($foreigncurr\_ta$) , sum of Financial Services Fees˙Euro + Other Professional Fees˙Euro + Other Operating Expenses˙Euro)/Total assets ($Expense\_ta$) , Sum of all increases and decreases of derivatives transactions. Both assets and liabilities are included ($derivative\_nav$).

[5]Seventeen percent is the value associated with the highest decile of daily turnover relative to NAV. A total of 529 observations involving 143 funds are dropped. This cut-off occurs at the point where the positive skew of the distribution is maximally reduced. We also deleted the upper and lower 0.5 percentile of all the variables to exclude influential outliers.

[6]This ensures that the dummy variable coefficients can be interpreted without subtraction from an intercept term. If this adjustment is not made the STATA procedure includes an intercept and this is awkward to interpret since it implicitly applies to all periods.

[7]As compared to Arellano and Bond (1991), the transformed equation in Arellano and Bover (1995) is obtained by subtracting the average of all available future observations instead of differencing. The model is particularly suitable for unbalanced panel as it has the virtue of preserving the sample size.

[8]For the QE variables we also use the pass-through option in order to avoid their transformation and to guarantee that they are instrumented with their own value. For all regressions we use a robust two-step estimator where the standard covariance matrix is robust to panel-specific autocorrelation and heteroscedasticity and the standard error is correct using the Windmeijer finite sample methodology.

ECB between March 2015 and June 2016. The second sample (*non PSPP-holders*) includes funds that have never held PSPP assets.[9] In our discussion of results we focus almost entirely on the case of *PSPP-holders* as they are the only potential sellers to the ECB. We also rely more on the results explaining net purchases rather than the proportional holdings. We do not generally find significant results for the case of proportional holdings of *PSPP holders* or for the rebalancing of the *non PSPP-holders*.[10]

Summary statistics for the dependent variables and the fund characteristics (including the 'within' and 'between' standard deviations) for the PSPP-holders are provided in Tables 1, 2 and 3. The results reveal that most of the variance is explained by cross-unit variation while the within variation is limited. The only exception is for redemption and issuance which display a substantial within variation.

Before discussing regression results it is worth noting from descriptive statistics in Table 3 that there is significant correlation between the proposed explanatory variables in Equation (2). The pooled correlations shown in the top panel of Table 3 reveal that turnover is highly correlated with leverage (0.63) , foreigncurr (0.26) , and issuance (0.21). These raw correlations are difficult to interpret - specifically we do not know whether they reflect common time or cross-sectional variation.

5   Data and Results

5.1   Data

Our analysis focuses on the large investment fund industry domiciled and reporting in Ireland.[11] The Central Bank of Ireland's Statistics Division collects quarterly balance sheet information and monthly investment fund information through investment fund returns. This data provides a comprehensive overview of all funds' quarterly accounts characteristics, gross buy and sell transactions and positions vis-á-vis residents and non-residents by reporting currency. Accounting information includes – amongst other items - the security-by-security information on holdings of equities, debt securities and derivatives; profits and losses per period on an accruals basis, interest, dividends, rents and other income. Our dataset spans the quarters from Q1 2014 to Q3 2016 and includes all investment funds categorized as Equity, Bond, Mixed, Hedge, Real Estate, Money Market and Others. As we mentioned previously, we structure the analysis by two sub-samples depending on whether funds have a substantial holding of PSPP assets. We obtained all event-by-event PSPP intervention data by ISIN identifiers from the Markets Division of the Irish Central Bank.

Table 4 provides a first overview of the two samples. This reveals that PSPP asset holders are mainly bond and mixed funds, while the non-PSPP asset holders are

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[9]The samples are identified using ISIN by ISIN intervention data provided by the Financial Market Division of the Central Bank of Ireland. The use of those data guarantees no uncertainty in the identification of PSPP-holders.

[10]In the non-PSPP sample we also include dummy variables that capture the type of fund (bond, equity, hedge, MMF, Mixed, Other or Real estate).

[11]The total asset value of the sector in 2016q3 is about 2 trillion euro.

dominated by equity funds.[12] Figure 2 provides a deeper look into the portfolio of PSPP holders and suggests that most of the funds hold a very small percent of PSPP assets (right axis). Also combining the share of PSPP holdings with the interquartile range of their value (left axis) the graph suggests that large PSPP holders are also large funds.[13]

Figure 3 plots the average end-of-quarter proportional portfolio compositions of the PSPP asset-holding funds according to asset type/issuer, maturity and currency (as defined above). In the case of the holdings by asset type, the graphs includes only the main types (i.e. cases where, on average, the asset type represents more than 4% of the total assets held by the funds).[14] We see that, on average, portfolios of PSPP asset-holding funds are heavily concentrated on government bonds denominated in euro with maturity longer than two years. The time profile of proportional holdings exhibits limited movement. In fact, the proportional holdings of government bonds has clearly increased since the start of the ECB's asset program. This suggests that funds have persistent preferences but it does not necessarily reflect the true impact of the EAPP. The increase in the share of assets allocated to government bond could merely be the consequence of revaluation effects combined with redemptions.

More reliable insights about rebalancing can be added from an examination of transactions for the same asset classes. Figure 4 shows net purchases and this produces quite a different picture to that of the proportional holdings. On a net basis, funds have clearly sold euro denominated government bonds (particularly those with maturity longer than two years). They also seem to have moved towards other types of bonds and to derivatives.[15] This graphical analysis seems to support the presence of a portfolio rebalancing channel. However, it is important to asses whether this behaviour could be due to normal rebalancing prompted by non-QE related macroeconomic developments. We now consider the results of a panel regression analysis that quantifies the rebalancing sensitivity to asset purchases for the different phases of the programme while controlling for fund characteristics, macroeconomic developments and for fund fixed-effects.

5.2   Results

Table 5 provides results for the dynamic panel regression in Equation (1) explaining net purchases of the six largest asset classes in the portfolios of funds defined as significant holders of PSPP assets. In this first regression we exclude fund characteristics in the control set. We use the Arellano-Bover forward orthogonalisation approach to purge fixed effects. In general, the results have intuitive appeal and their interpretation coincides with our expectations. Overall, there is only significant evidence of rebalancing

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[12]The total asset value of the PSPP-holders in 2016q3 is about 340 billion euro, while for non-PSPP holders it is about 1.6 trillion.

[13]For example, size can vary a lot – from about 80 million to 1 billion for the bar between 0.6 and 0.7 – which are funds that held between 60 and 70 percent of their portfolio in PSPP assets.

[14]Figures are the values before demeaning and after removing funds with turnover relative to NAV > 17%.

[15]Results for non-PSPP-holders are reported in Figure 5 and Figure 6. Overall the non-PSPP funds seem to hold mainly equities denominated in USD dollars. Their portfolios are spread across all maturities. Also net purchases do not suggest a clear rebalancing pattern.

during the second phase of the purchase programme and only two assets in which significant QE rebalancing effects can be identified. The coefficients on the second-phase QE dummies (QE_second) indicate that net purchases of government bonds are more negative than usual, and net purchases of bonds issued by deposit taking corporations are greater than usual, when the programme was scaled up. The significant negative flows out of government bonds in the second phase of the programme probably reflects both the increased intensity of purchases and an increased willingness to divest of APP assets at the first sign of improving economic conditions (which could signal an earlier timing of tapering than originally expected). We find no significant rebalancing effects during the anticipation period and no significant rebalancing flows in any QE period towards equities or derivatives. It is worth noting that equities and derivatives represent only a very small proportion of the portfolio of the funds (see Table 1).

While this first regression provides limited but broadly supportive evidence for rebalancing it should be noted that, despite the presence of a lagged dependent variable, the regression residual remains significantly autocorrelated in two cases (there is clear evidence of AR(2) in the differenced error implying AR(1) in levels for the case of bonds issued by governments and by deposit taking institutions). Furthermore, the tests for validity of the GMM instruments indicate weakly specified models in the cases of bonds issued by governments and by NFCs. These issues are ameliorated to a significant extent in the more general specification now discussed.

Table 6 provides regression results for Equation (2) where we include fund issuance, redemption, leverage and turnover characteristics (both on their own and interacted with QE dummies) to explicitly allow heterogeneity in portfolio rebalancing behaviour across funds. In comparison with the first set of regression results we observe a similarly significant (but now larger) increase in the purchase of the bonds issued by deposit taking institutions regardless of the fund characteristics (i.e. a significant positive coefficient on the QE_second dummy in the $Bond_{dtc}$ column). The net purchase of bonds of deposit taking institutions is also large and statistically significant for the second QE period among the funds that are relatively more engaged in the issuance of new fund units (i.e. a significant positive coefficient on the $Second\_iss$ dummy).

The significant negative effect found in our first regression in the case of net purchases of Government bonds on the non-interacted QE_second dummy becomes insignificant in the more general specification. However, we now see that the coefficient on redemption on its own, $redem\_nav$, is negative and significant and there are two significantly negative coefficients on the interactive QE dummies ($First_{rdm}$ and $Second_{rdm}$) indicating net sales of government bonds by funds that experienced relatively more redemptions of fund units generally and specifically during the QE-active periods. This is consistent with a coincidence in the rebalancing behaviour of fund investors away from funds focused on holding government bonds and rebalancing away from government bonds by the funds themselves. The coefficient on Issuance on its own is significantly positive but there is no significance for the interaction of issuance with QE dummies.

There is significant support for the rebalancing channel due to movement into bonds issued by those classified as 'Other' ($Bond_{other}$). Here we observe significantly more net purchases during each of the QE-active periods by funds experiencing relatively higher redemptions as well as those experiencing relatively more issuance of

their own units (i.e. significance of coefficients on $First_{rdm}$, $Second_{rdm}$, $First_{iss}$ and $Second_{iss}$). It is noteworthy that there was little significant evidence of rebalancing towards equities (except for the case of funds with relatively more leverage) or derivatives even though these assets are significant (if small) elements of the *PSPP-holder's* portfolios. Overall, the results for this more flexible regression specification are mostly supportive of a rebalancing channel at work and it is worth mentioning that this model (with the exception of one marginal case for each test) is better supported by the specification tests.

Contrary to our prior expectations, there is evidence of a withdrawal from bonds issued by non-financial corporations ($Bond_{nfc}$) in both QE-active periods by funds with relatively high redemptions. Thus, unlike the findings of studies of rebalancing behaviour during US, UK and Japanese QE programmes, NFCs do not seem to benefit from portfolio rebalancing in the Euro Area case (investment is instead directed towards bank bonds and bonds of issuers classified as 'Other').

The results just discussed hint at a rebalancing channel through redemptions and issues in combination with portfolio rebalancing at the fund level. We also found some correspondence in the level of leverage and QE effects. To asses these indirect channels we examine how redemptions, issues, leverage and turnover for PSPP-holding funds was affected by EAPP. Table 7 provides results for regressions with a similar structure to that of Equations (1) but with redemption, issuance, leverage and turnover (all relative to NAV) as the dependent variables. We see that redemptions rose more significantly than issuances for the PSPP holding funds and these effects are rising in magnitude over the course of the asset purchase programme and its anticipation. The use of leverage seems to have been unaffected by the EAPP and turnover only rose significantly in the second QE-active period. Overall, the redemption, issuance and activity evidence is consistent with a flight of investment away from PSPP holding funds.

The *non-PSPP holders* by definition were not directly affected by the relatively high level of purchases of PSPP assets by the ECB because they were not holding these assets. However, the standard rebalancing channel is expected to act indirectly through the higher pricing (and lower yield) of assets that are close substitutes for the assets purchased. To assess whether there is any evidence for these indirect effects we run the same regressions as above for various fund categories within the sample of funds that never held PSPP assets during our sample. Regression results pertaining to Non-PSPP holding funds categorised as Bond, Mixed and 'Other' are displayed in Tables 8, Table 9 and Table 10 respectively. In this specification we exclude interactions between fund characteristics and QE dummies (again we focus on the regression explaining net purchases rather than the value of holdings).

In the case of non-PSPP-holding Bond funds, Table 8, the first result that confirms a rebalancing channel is the significant coefficient on the QE_second dummy in the case of $Bonds_{gov}$. This shows that there was significantly higher net purchases of government bonds by non-PSPP holding funds in the second phase of the EAPP (note that since these are the funds than never held PSPP assets this implies a rebalancing to government bonds that were not eligible for purchase under the purchase programme - either non-EA government bonds or those with non-eligible maturities). The only other significant effect was the selling of bonds issued by deposit taking corporations

in the QE anticipation period. This runs contrary to the presumed rebalancing channel but since we have hitherto found no evidence for an anticipation effect we regard this as a spurious result.

Table 9 shows the analogous results for the Mixed funds in the non-PSPP sample. In this case we find evidence of rebalancing during the anticipation period away from Government issued bonds (these could be bonds that are close substitutes for those anticipated to be purchased under EAPP) towards bonds issued by the NFCs in both the anticipation and first QE periods. The case of funds classified as 'Others' is contained in Table 10 and here we see that there is a significant move away from equities and derivatives towards the net purchases of bonds issued by NFCs in the second QE period and towards bonds issued by unclassified issuers in both QE periods. Overall, these results provide quite supportive evidence in favour of the rebalancing channel.

Once again, there is a possibility that investors are rebalancing even if the funds themselves are not. To assess this we again run regressions explaining the redemption and issuance behaviour of the non-PSPP holding funds. Table 11 concerns redemption, issuance, leverage and turnover for the non-PSPP Bond funds. Support for investor rebalancing in this case should be in the form of increased issuance of units and reduced redemptions (or no redemption). We indeed see no evidence of increased redemptions. In support of movement into non-PSPP investment funds we also see evidence of increased issuance in the second QE period. Overall, this probably reflects an increase in investment in the non-PSPP fund sector specialising in Bonds that can give investors similar exposure to what they would usually obtain from investment in units of PSPP-holding funds.

There is also a significant increase in issuance in both the first and second QE periods for Mixed funds (Table 12) combined with a distinct absence of any evidence for increased redemptions. So this category of non-PSPP holders also experienced net new investment. For Other funds we find no evidence of redemption associated with QE but also no net issuance (Table 13). Overall, there is substantial evidence that investors have moved their investments away from PSPP-holding funds towards non-PSPP-holding funds and this confirms an investor mediated rebalancing channel.

5.2.1 Rebalancing: Euro Area & RoW

The results so far concern the rebalancing of portfolios by asset-type. Figures 7(a) to 7(d) show 4 different views of net-purchases according to the region of issuance of the assets concerned. Figure 7(a) shows, for the case of PSPP-holding funds, the EA/RoW breakdown of the two asset categories where significant parameters on net purchases were found (see Table 5, specifically the columns relating to government bonds and bonds issued by deposit taking corporations). In all 11 quarters shown there is strong evidence of net selling of EA government bonds. However, in 9 out of 11 of the quarters we also observe net purchases of government bonds that are issued outside the EA. The situation concerning net purchases of bond issued by deposit taking corporations suggests that this activity was mostly in favour of those issued outside the EA.

Figure 7(b) presents the EA/RoW breakdown of the net purchases of government bonds by non-PSPP-holders (these were also found to be statistically significant before

being categorised as EA or RoW). The graphical breakdown clearly indicates that the majority of the rebalancing by non-PSPP-holders was towards government bonds issued outside the EA. Likewise, Figures 7(c) and 7(d) show that a large proportion of the 'Mixed' and 'Other' non-PSPP funds also exhibit rebalancing towards RoW assets. The associated regressions (not shown) support this finding once fund characteristics are interacted with QE dummies. In particular, funds with relatively large issuance of new units significantly rebalance their portfolios away from EA-issued assets. Overall, there appears to be substantial evidence for rebalancing that may trigger an exchange rate adjustment channel (i.e., depreciation of the Euro and increased imported inflation).

5.2.2 Rebalancing by Maturity

Table 14 shows panel regression results pertaining to the rebalancing across assets with different maturities for the case of PSPP-holding investment funds. This again shows a significantly negative parameter on the second QE dummy variable for the case of maturities covered by the programme (maturity > 2 years). We see that there is statistically significant evidence of a move towards bonds with maturity less than 2 years in the first QE period.

In the case of non-PSPP holding funds we found evidence of rebalancing effects as follows. For the Bond funds we found a consistently significant increase in holdings of government bonds (these are non-PSPP bonds by definition) with maturity greater than 2 years. For funds classed as 'Other' we also find a positive and significant increase in holdings of assets with maturity greater than 2 years. These results are supportive of QE effects working through investor preferences for assets with greater average duration (and some additional yield). This should contribute to a flattening of the term structure and an improvement in long term funding costs for both the public and private sectors. Hedge, Mixed and Real Estate Funds never provide significant results.

6 Robustness Analysis

A number of robustness checks were carried out. Firstly, we examined a number of alterations in the lag structure of the Arellano-Bover GMM specification. We found that results were stable for the use of lags as instruments for the case of (i) lags 2 and 3, (ii) lags 2, 3 and 4 or (iii) lags 2 to 5. In many cases there is actually quite weak evidence for the need for a lagged dependent variable in the regression. This suggests that a static panel could be used as an alternative to the GMM approach. We found that (for the basic model without the interaction with fund characteristics) many of the core results discussed above survive when we move to a static fixed-effects panel regression method. Specifically, the evidence of a move by PSPP-holders from PSPP assets to those issued by deposit taking corporates remains significant. We had some concern that our PSPP sample of funds could contain many funds that are strictly mandated to only invest in PSPP assets. However, even when we dropped funds with consistently over 90% of their portfolio in EA issued government bonds the results remained

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broadly similar (i.e. coefficients changed slightly but signs and significance remained the same).

As regards the sample of funds that had been dropped from the main analysis due to extremely high daily turnover; we carried out all of the same regressions as discussed above on this sample to ensure that we were not loosing important information. We found some similar results for such funds but, more often than not, the results lacked consistent statistical significance. This reflects the fact that the sample of funds in this category is quite small, diverse in their behaviours and, the number of parameters being estimated is relatively large (especially in the specifications that includes interaction terms). There is however evidence of a statistically significant increase in investment in $Bonds\_other$ in the standard regression without interaction terms for the PSPP-holding high-turnover funds in anticipation of QE and, even more so, for the first and second QE phases. Together with the negative sign (albeit statistically insignificant) on all the QE dummies for $Bonds\_gov$, this can be regarded as valid evidence for a rebalancing from PSPP-assets to non-PSPP assets. PSPP-holding high-turnover funds also tend to show a move towards holding short term securities (this is into securities outside the purchasable basket). The results for the non-PSPP high-turnover funds do not provide significant evidence of rebalancing but in this case there is some evidence of increased redemptions and decreased issuance of fund units across the QE periods.

7 Conclusion

We have examined the portfolio rebalancing behaviour of a large sample of investment funds before and during the Eurosystem's Public Sector Purchase Programme (PSPP). We find evidence that funds most exposed to the purchase programme rebalanced their portfolios towards bonds issued by deposit taking corporations, into assets with maturities outside the maturities eligible for purchase under the programme and away from euro-denominated assets. For subsets of funds focused on non-PSPP eligible assets we found evidence of moves into longer term securities and away from euro denominated assets.

Via an examination of redemptions and issues by funds of their own shares (units) we found that investors rebalanced away from PSPP-holding funds towards those focused on holding other types of assets. This probably reflects an increase in investment in the non-PSPP fund sector specialising in Bonds that can give investors similar exposure to what they would usually obtain from investment in units of PSPP-holding funds. Investor rebalancing behaviour interacts significantly with portfolio rebalancing behaviour of the funds themselves.

Overall, we regard our analysis as providing support for the beneficial effects of the extended asset purchase programme. In economic terms (based on the size of net purchases) the effects do not appear large. Given that we only find significant effects after the pace of purchases was increased, the choice of programme scale may be crucial.

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Figure 1: Eurosystem holdings under the expanded asset purchase programme. Backlink to page 4.
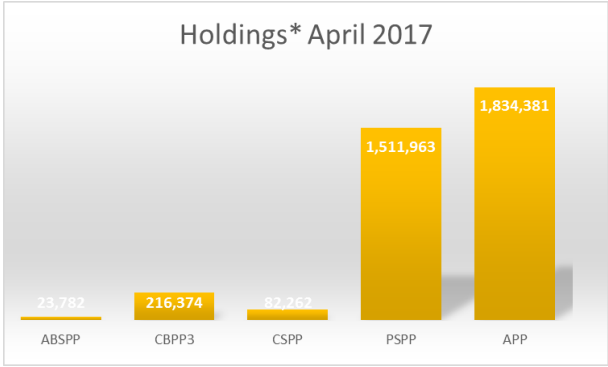
Figure 2: Distribution of share of PSPP assets held by each fund in percent (right axes) and interquartile range of the value of PSPP assets in the portfolio of each fund (left axes). Backlink to page 9.
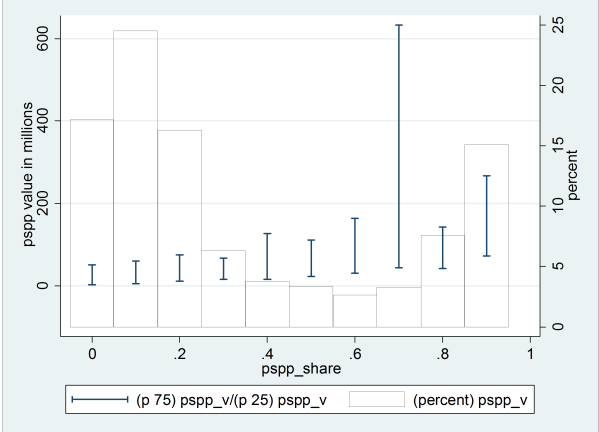
Figure 3: PSPP-holders: Portfolio composition / stock. Backlink to page 9.

(a) Asset type

(b) Maturity

(c) Currency
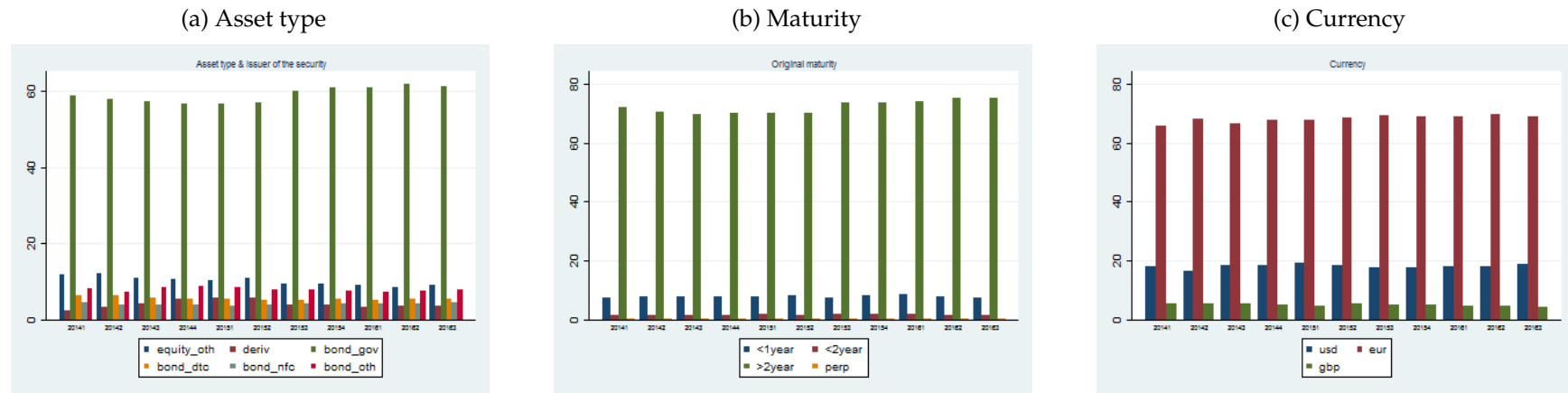
Figure 4: PSPP-holders: Portfolio composition / net purchases. Backlink to page 9.

(a) Asset type

(b) Maturity

(c) Currency
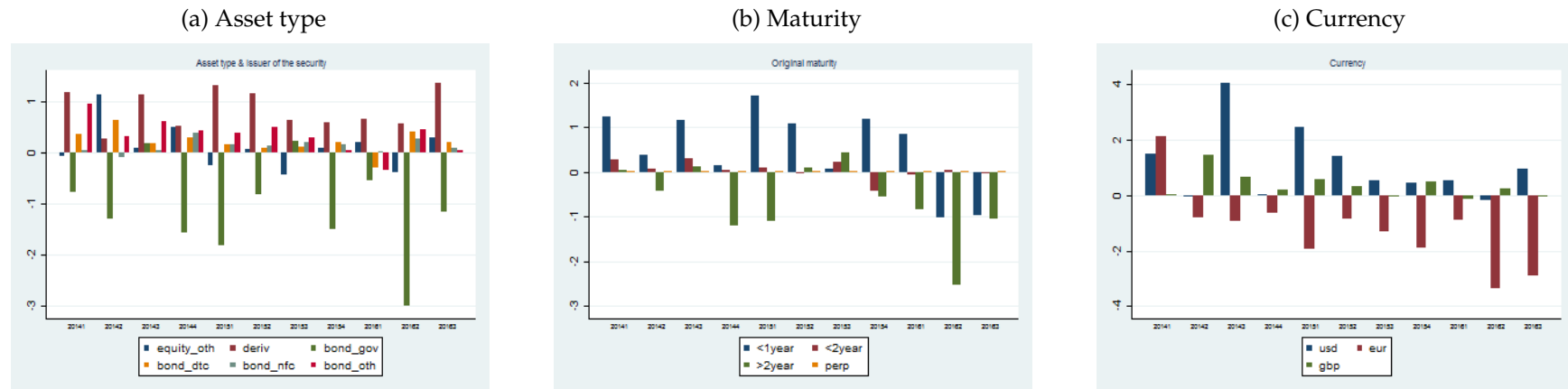
Figure 5: Non-PSPP-holders: Portfolio composition / stock. Backlink to page 10.

(a) Asset type

(b) Maturity

(c) Currency
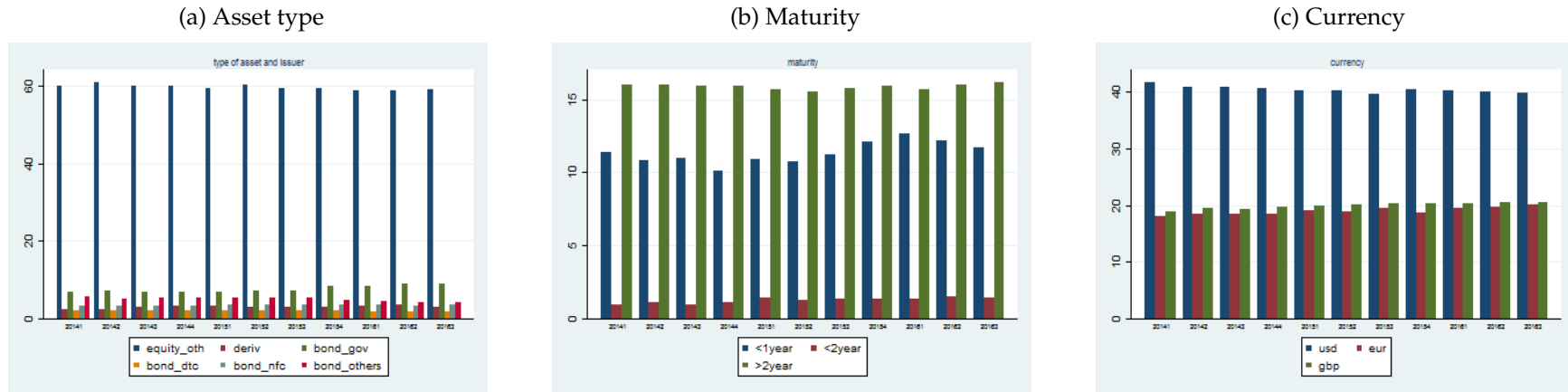
Figure 6: Non-PSPP-holders: Portfolio composition / net purchases. Backlink to page 9.

(a) Asset type

(b) Maturity

(c) Currency
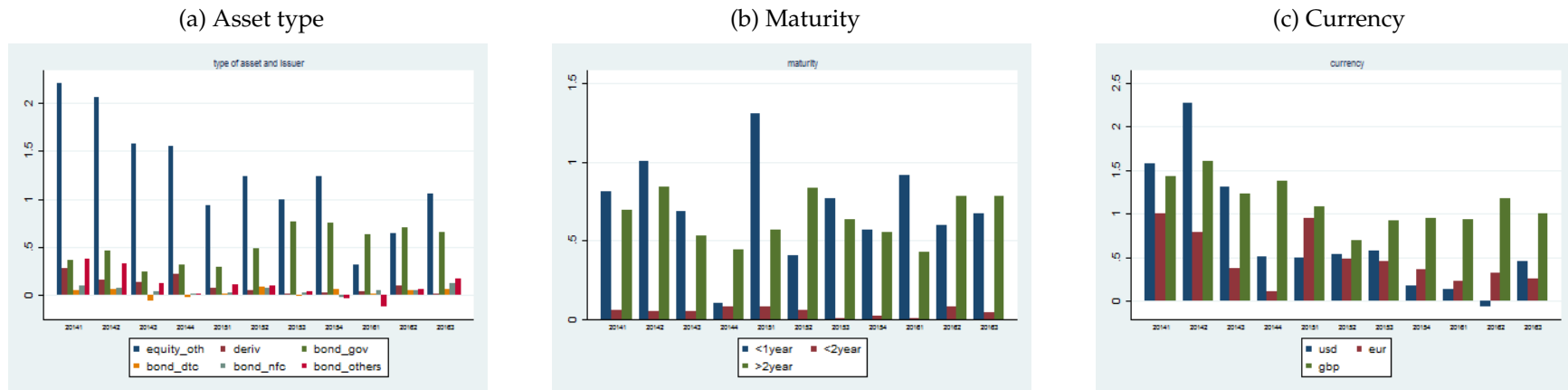
Figure 7: Asset type and area of issuance. Backlink to page 13.

(a)

(b)

(c)

(d)

Porfolio composition by Asset type - Mean & Standard Deviations											
	cash	equity˙dtc	equity˙others	derivatives	secborr	overdr	othass	bond˙gov	bond˙dtc	bond˙nfc	bond˙ofi	bond˙others
Mean	0.28	0.05	10.06	4.08	0.06	3.61	3.02	59.07	5.49	4.07	0.02	7.88
σ_o	1.56	1.84	18.59	11.17	1.01	6.54	7.03	31.55	8.79	7.59	.24	11.28
σ_b	1.58	1.81	18.09	10.79	0.77	6.83	5.58	30.16	8.96	7.16	.30	10.77
σ_w	0.95	.63	4.47	3.94	.54	2.90	4.11	9.99	2.28	2.71	0.16	3.31

Portfolio composition by Original maturity and currency - Mean & Standard Deviations						
	less1year	less2year	more2year	perp	curr˙usd	curr˙euro	curr˙gbp
Mean	7.91	1.66	72.35	0.02	18.16	68.24	4.95
σ_o	12.76	4.36	27.94	0.14	22.54	34.38	0.102
σ_b	11.80	3.80	26.78	0.13	22.18	34.16	9.61
σ_w	6.62	2.43	10.08	0.08	5.39	4.65	2.56

This table reports the descriptive statistics for the dependent variables used in Equation (**??**) for quarterly observations from Q1 2014 to Q3 2016 (before demeaning). The standard deviation statistics; σ_o , σ_b and σ_w, refer to overall, between and within variation respectively.

Porfolio composition by Asset type - Mean & Standard Deviations											
	cash	equity˙dtc	equity˙others	derivatives	secborr	overdr	othass	bond˙gov	bond˙dtc	bond˙nfc	bond˙ofi	bond˙others
Mean	-0.01	0.00	0.10	0.85	-0.01	0.31	-0.05	-1.11	0.20	0.13	0.00	0.31
σ_o	0.77	0.49	4.11	5.61	0.26	3.95	6.62	11.09	2.40	2.23	0.11	3.49
σ_b	0.63	0.28	2.29	4.59	0.14	1.80	3.73	8.56	1.35	1.31	0.07	1.69
σ_w	0.69	0.46	3.65	3.57	0.22	3.72	6.23	8.65	2.15	1.95	0.10	3.19

Portfolio composition by Original maturity and currency - Mean & Standard Deviations						
	less1year	less2year	more2year	perp	curr˙usd	curr˙euro	curr˙gbp
Mean	0.49	0.04	-0.67	0.00	1.03	-1.30	0.31
σ_o	8.65	1.96	12.84	0.01	10.22	13.36	4.12
σ_b	4.89	0.67	9.82	0.01	8.55	8.96	2.45
σ_w	8.02	1.88	10.18	0.01	8.50	10.69	3.69

This table reports the descriptive statistics for the dependent variables used in Equation (**??**) for quarterly observations from Q1 2014 to Q3 2016 (before demeaning).

Table 3: **Descriptive Statistics and Correlations of PSPP-holders / Fund characteristics.**
Backlink to page 8.

Variable Correlations								
	size	foreigncurr_ta	expense_ta	leverage_nav	turnover_nav	derivative_nav	redem_nav	issuance_nav
size	1							
foreigncurr_ta	0.124***	1						
expense_ta	-0.170***	0.0649**	1					
leverage_nav	0.140***	-0.0128	-0.141***	1				
turnover_nav	0.147***	0.268***	0.121***	0.144***	1			
derivative_nav	0.180***	0.246***	-0.00650	0.276***	0.632***	1		
redem_nav	-0.0141	-0.0729**	0.104***	0.0461*	0.176***	0.0536*	1	
issuance_nav	0.0431	0.0558*	0.0235	0.00148	0.218***	0.0408	0.131***	1

Descriptive Statistics - Mean & Standard Deviations - Mean 2014q1 - 2016q3								
	size	foreigncurr_ta	expense_ta	leverage_nav	turnover_nav	derivative_nav	redem_nav	issuance_nav
Mean	26.09	25.26	0.42	25.50	2.31	32.14	2.83	2.81
σ_o	40.30	28.72	0.61	81.57	3.41	96.56	3.82	6.44
σ_b	36.93	28.22	0.66	80.06	3.33	107.23	2.85	5.26
σ_w	9.07	5.73	0.30	32.64	1.67	43.72	2.81	5.18

Descriptive Statistics - Mean & Standard Deviations - Mean 2014q1 - 2014q3								
	size	foreigncurr_ta	expense_ta	leverage_nav	turnover_nav	derivative_nav	redem_nav	issuance_nav
Mean	26.02	26.72	0.45	17.94	2.14	21.93	2.34	3.17
σ_o	36.97	29.60	0.55	45.60	3.26	61.10	2.76	5.49
σ_b	36.31	29.71	0.62	43.50	3.51	66.42	2.97	5.53

The first two parts of the table report correlation and the descriptive statistics for the investment fund characteristics for the quarterly observations from Q1 2014 to Q3 2016 (before demeaning). The standard deviation statistics; σ_o, σ_b and σ_w, refer to overall, between and within variation respectively. The last part of the table reports the descriptive statistics for the quarterly observations from Q1 2014 to Q3 2014. In this case, the standard deviation statistics; σ_o and σ_b, refer only to the overall and between variation.

Table 4: **Number of funds by investment strategy.**
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	2014q1	2014q2	2014q3	2014q4	2015q1	2015q2	2015q3	2015q4	2016q1	2016q2	2016q3	Total
						PSPP-holders						
Bond	114	113	119	117	121	123	129	132	134	141	141	1,384
Equity	0	0	0	0	0	0	0	0	1	1	1	3
Hedge	1	1	1	2	3	2	2	3	4	5	5	29
Mixed	44	47	47	47	41	49	51	50	48	52	53	529
Other	5	6	6	7	8	8	8	8	9	11	11	87
Total	164	167	173	173	173	182	190	193	196	210	211	2,032
						Non-PSPP-holders						
Bond	377	367	383	376	385	392	406	412	406	416	427	4,347
Equity	1,086	1,070	1,081	1,083	1,095	1,119	1,142	1, 164	1,183	1,188	1,222	12,433
Hedge	527	501	499	445	449	449	462	449	452	445	429	5,107
MMF	26	18	25	19	23	21	19	19	18	20	21	229
Mixed	398	417	418	425	424	432	464	469	478	493	492	4,910
Other	316	316	319	332	356	365	379	383	395	408	407	3,976
Real Estate	43	56	63	77	87	89	99	93	117	124	136	984
Total	2,773	2,745	2,788	2,757	2,819	2,867	2,971	2,989	3,049	3,094	3,134	31,986

This table reports the number of funds in the two samples by investment strategy. Source: author's calculations.

Table 5: **PSPP SAMPLE: Net purchases.**
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VARIABLES	Equity_others	Derivatives	Bond_gov	Bond_dtc	Bond_nfc	Bond_others
qe_antic	0.195	0.0108	-1.079	0.0303	0.189	-0.375
	(0.317)	(0.191)	(1.090)	(0.216)	(0.158)	(0.311)
qe_first	-0.106	0.234	-1.161	0.173	0.234	-0.457
	(0.284)	(0.301)	(1.510)	(0.241)	(0.225)	(0.415)
qe_second	-0.697	0.108	-4.922**	0.772**	0.454	-0.180
	(0.460)	(0.330)	(2.033)	(0.355)	(0.301)	(0.573)
debt_net	-0.000860	-0.000489	-0.0130***	0.000634	0.000741	0.00113
	(0.00113)	(0.000805)	(0.00387)	(0.000629)	(0.000530)	(0.000899)
US_long_yield	-0.439	-0.0952	-3.817**	0.861**	0.463	0.274
	(0.434)	(0.358)	(1.795)	(0.335)	(0.319)	(0.584)
us_corp_spread2	-0.203	-0.0288	0.134	0.171	0.0104	0.0480
	(0.125)	(0.120)	(0.608)	(0.108)	(0.0722)	(0.103)
us_vix_vol	-0.0584*	-0.0351*	-0.146	0.0317	0.00343	0.00891
	(0.0353)	(0.0196)	(0.149)	(0.0204)	(0.0139)	(0.0255)
L.dep_others	-0.159**	-0.266***	-0.0206	-0.0769	-0.112**	-0.0931
	(0.0764)	(0.0608)	(0.0652)	(0.0605)	(0.0496)	(0.0750)
Observations	1,340	1,352	1,339	1,340	1,346	1,344
Number of frfundkey	174	174	174	174	174	174
AR1-p-value	0.00687	0.0194	1.25e-05	0.000860	0.000554	0.00201
AR2-p-value	0.984	0.724	0.0929	0.131	0.0577	0.961
Hansen-J-p-value	0.461	0.116	0.0213	0.119	0.380	0.457
Wald-p-value (join QE)	0.1393	0.6964	0.0028	0.0215	0.2291	0.1423

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

This table reports panel regression results for the model described in Equation (1) for net purchases. We report only the results for asset classes which proportion over total assets is on average above 4 % . We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100. Debt_net is in billion of euro.

Table 6: **PSPP SAMPLE: Net purchases / Interaction with fund characteristics.**
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VARIABLES	Equity_others	Derivatives	Bond_gov	Bond_dtc	Bond_nfc	Bond_others
qe_antic	0.299	-0.857	0.845	0.159	0.328	0.296
	(0.612)	(1.023)	(0.992)	(0.263)	(0.455)	(0.389)
qe_first	-0.159	0.502	1.550	0.550	0.181	0.174
	(0.612)	(0.583)	(1.278)	(0.344)	(0.311)	(0.564)
qe_second	-0.204	0.0646	-0.754	1.608**	0.281	0.616
	(1.049)	(1.070)	(1.739)	(0.683)	(0.458)	(0.853)
ant_rdm	-35.73	76.98	-70.53	8.807	-54.19	39.14
	(32.57)	(54.50)	(56.58)	(34.73)	(40.61)	(33.01)
first_rdm	-4.868	-20.64	-55.68*	-0.790	-31.00***	51.71***
	(22.65)	(39.11)	(32.83)	(10.76)	(10.30)	(17.06)
second_rdm	-0.419	-28.69	-70.87**	3.817	-22.21**	57.30***
	(23.03)	(36.14)	(35.29)	(8.530)	(9.680)	(17.10)
ant_iss	-1.075	6.000	29.54	0.422	-6.575	19.20
	(8.946)	(20.51)	(24.80)	(8.030)	(9.617)	(13.34)
first_iss	3.069	3.422	15.88	5.732	-9.337	18.71***
	(7.758)	(14.21)	(21.29)	(3.534)	(6.440)	(6.161)
second_iss	5.620	1.185	6.323	8.735**	-10.07	21.22***
	(8.783)	(12.03)	(20.44)	(4.195)	(7.256)	(7.202)
redem_nav	-12.04	24.52	-97.66**	-23.95**	11.32	-63.59***
	(23.85)	(27.01)	(39.69)	(11.59)	(10.15)	(15.22)
issuance_nav	20.21	14.97	157.5***	22.24*	30.86**	43.50**
	(16.03)	(21.49)	(41.87)	(11.37)	(13.69)	(18.12)
L.dep	-0.206***	-0.261***	-0.0178	-0.101*	-0.106**	-0.0885
	(0.0733)	(0.0684)	(0.0403)	(0.0526)	(0.0512)	(0.0865)
Observations	1,308	1,319	1,307	1,307	1,313	1,311
Number of frfundkey	173	173	173	172	173	173
AR1-p-value	0.00721	0.00659	0.000196	3.74e-05	0.000591	0.00730
AR2-p-value	0.978	0.939	0.686	0.0813	0.110	0.538
Hansen-J-p-value	0.612	0.00730	0.116	0.189	0.655	0.328
Wald-p-value (join QE)	0.9574	0.3054	0.0100	0.0433	0.8233	0.4842

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (2) for net purchases. We report only the results for asset classes which proportion over total assets is on average above 4 % . We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100. The regressions include also debt_net, fin_controls, turnover_nav, leverage_nav and their interaction with the QE˙dummies.

Table 7: **PSPP SAMPLE : Redemption, Issuance, Leverage & Activity.**
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VARIABLES	redem_nav	issuance_nav	leverage_nav	turnover_nav
qe_antic	0.896**	0.250	-0.597	0.0376
	(0.384)	(0.289)	(1.116)	(0.122)
qe_first	1.571***	0.743**	1.894	0.0818
	(0.394)	(0.317)	(1.286)	(0.162)
qe_second	3.044***	1.196***	0.400	0.665***
	(0.599)	(0.415)	(2.212)	(0.252)
debt_net	0.00527***	0.00138	-0.00609	0.00259***
	(0.00104)	(0.000913)	(0.00915)	(0.000518)
US_long_yield	2.082***	1.348***	1.051	0.426
	(0.562)	(0.408)	(1.893)	(0.264)
us_corp_spread2	0.564***	0.428***	0.297	0.150**
	(0.165)	(0.128)	(0.376)	(0.0704)
us_vix_vol	0.0852**	0.0376	0.00404	0.0432***
	(0.0347)	(0.0261)	(0.150)	(0.0157)
L.dep	-0.0680	-0.0852*	0.621***	-0.143
	(0.0574)	(0.0461)	(0.0443)	(0.0887)
Observations	1,351	1,343	1,334	1,328
Number of frfundkey	174	173	174	174
AR1-p-value	0.000236	0.000134	0.0101	0.0156
AR2-p-value	0.290	0.198	0.0600	0.822
Hansen-J-p-value	0.0127	0.373	0.0526	0.119
Wald-p-value (join QE)	0.0000	0.0152	0.2558	0.0037

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for fund characteristics. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100.

VARIABLES	(1) Equity_others	(2) Derivatives	(3) Bond_gov	(4) Bond_dtc	(5) Bond_nfc	(6) Bond_others
qe_antic	0.162	0.0661	0.466	-0.361**	0.139	-0.103
	(0.284)	(0.0566)	(0.362)	(0.164)	(0.254)	(0.443)
qe_first	0.329	-0.0726	0.596	-0.352	0.440	0.148
	(0.322)	(0.0927)	(0.461)	(0.222)	(0.350)	(0.551)
qe_second	0.891	-0.0864	1.635**	0.0616	0.753	1.246
	(0.564)	(0.168)	(0.831)	(0.317)	(0.547)	(0.839)
debt_net	0.000101	0.000351*	0.00200	0.00118*	0.000805	0.00124
	(0.00108)	(0.000206)	(0.00156)	(0.000606)	(0.000995)	(0.00145)
US_long_yield	0.912	-0.115	1.902**	0.284	0.735	1.395*
	(0.574)	(0.175)	(0.833)	(0.318)	(0.523)	(0.799)
us_corp_spread2	0.244*	-0.0923**	-0.198	0.0290	0.282*	0.556***
	(0.144)	(0.0466)	(0.202)	(0.0912)	(0.153)	(0.186)
us_vix_vol	0.0414	-0.0160	-0.00178	0.0210	-0.00259	0.0791*
	(0.0355)	(0.0100)	(0.0487)	(0.0186)	(0.0338)	(0.0414)
L.dep	-0.200***	-0.0828	-0.0909	-0.176***	-0.158***	0.00761
	(0.0653)	(0.0845)	(0.0570)	(0.0607)	(0.0495)	(0.0557)
Observations	2,920	2,897	2,814	2,850	2,740	2,788
Number of frfundkey	377	378	376	377	376	374
AR1-p-value	0.0200	0.00216	5.68e-06	1.13e-05	5.21e-08	1.21e-08
AR2-p-value	0.112	0.761	0.0102	0.232	0.00525	0.0124
Hansen-J-p-value	0.303	0.174	0.0147	0.0165	0.000436	0.000323
Wald-p-value (join QE)	0.2699	0.7219	0.1406	0.0132	0.3801	0.0322

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for net purchases. We report only the results where the proportional holding is on average above 4 % in the PSPP sample. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100. Debt˙net is in billion of euro.

Table 9: **NON-PSPP SAMPLE: MIXED FUND / Net purchases.**
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VARIABLES	(1) Equity_others	(2) Derivatives	(3) Bond_gov	(4) Bond_dtc	(5) Bond_nfc	(6) Bond_others
qe_antic	-1.419**	-0.0545	-0.280*	-0.0376	0.210***	-0.0129
	(0.723)	(0.125)	(0.165)	(0.0621)	(0.0639)	(0.101)
qe_first	-0.161	-0.0329	-0.332	0.0357	0.236***	0.0306
	(1.201)	(0.141)	(0.293)	(0.0821)	(0.0756)	(0.136)
qe_second	-0.132	-0.0700	-0.432	0.0691	0.229	0.0747
	(1.874)	(0.240)	(0.537)	(0.108)	(0.142)	(0.144)
debt_net	-0.00357	-5.70e-05	0.000263	0.000140	0.000356	0.000378
	(0.00317)	(0.000430)	(0.000807)	(0.000244)	(0.000249)	(0.000405)
US_long_yield	2.860	0.00546	-0.300	0.0791	0.173	0.0717
	(1.804)	(0.258)	(0.516)	(0.0960)	(0.133)	(0.0814)
us_corp_spread2	1.503***	-0.0457	-0.140	0.0266	0.0191	0.0520
	(0.480)	(0.0691)	(0.140)	(0.0321)	(0.0246)	(0.0585)
us_vix_vol	0.250***	-0.0158	0.00266	-0.000124	-0.0139	0.00810
	(0.0889)	(0.0153)	(0.0237)	(0.00277)	(0.00941)	(0.0118)
L.dep	-0.0931*	-0.101*	-0.143*	-0.0668	-0.185**	-0.236***
	(0.0524)	(0.0586)	(0.0781)	(0.113)	(0.0749)	(0.0780)
Observations	3,006	3,019	3,022	3,021	3,023	3,016
Number of frfundkey	414	415	416	414	414	416
AR1-p-value	8.08e-08	5.42e-05	0.00158	0.0493	0.00496	0.0134
AR2-p-value	0.503	0.130	0.0264	0.0191	0.148	0.123
Hansen-J-p-value	0.133	0.112	0.0344	0.431	0.102	0.204
Wald-p-value (join QE)	0.9879	0.9582	0.5131	0.7511	0.0053	0.7731

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for net purchases. We report only the results where proportional holdings are on average above 4 % in the PSPP sample. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100. Debt˙net is in billion of euro.

Table 10: **NON-PSPP SAMPLE: OTHER FUNDS / Net purchases.**
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	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Equity_others	Derivatives	Bond_gov	Bond_dtc	Bond_nfc	Bond_others
qe_antic	-0.553	0.0393	0.264	0.0633	-0.0122	-0.0113
	(0.940)	(0.185)	(0.367)	(0.0514)	(0.0330)	(0.0608)
qe_first	-2.818**	-0.371**	-0.0163	0.0781	0.0182	0.224**
	(1.127)	(0.144)	(0.432)	(0.0613)	(0.0234)	(0.0992)
qe_second	-3.755**	-0.554**	-0.337	0.115	0.0632*	0.512***
	(1.637)	(0.229)	(0.667)	(0.105)	(0.0347)	(0.195)
debt_net	-0.00159	-0.000696	0.000447	0.000165	0.000108	0.000395
	(0.00240)	(0.000462)	(0.00124)	(0.000172)	(7.72e-05)	(0.000372)
US_long_yield	-2.061	-0.356	-0.721	0.0723	0.0735	0.519**
	(1.367)	(0.224)	(0.666)	(0.0746)	(0.0449)	(0.204)
us_corp_spread2	-0.460	-0.113**	-0.134	-0.00400	0.00332	0.0487
	(0.395)	(0.0560)	(0.183)	(0.00770)	(0.0109)	(0.0361)
us_vix_vol	-0.0754	-0.0229*	-0.0257	-0.00294	-0.000889	0.0134
	(0.0806)	(0.0138)	(0.0348)	(0.00319)	(0.00292)	(0.0105)
L.dep	-0.0498	0.0910*	-0.109*	0.136	-0.129	-0.143**
	(0.0333)	(0.0489)	(0.0564)	(0.108)	(0.0940)	(0.0670)
Observations	2,586	2,584	2,509	2,561	2,582	2,588
Number of frfundkey	319	319	318	316	318	319
AR1-p-value	3.21e-07	4.55e-05	0.000182	0.0913	0.0442	0.0219
AR2-p-value	0.883	0.0574	0.572	0.353	0.626	0.282
Hansen-J-p-value	7.40e-05	0.158	0.0290	0	0.449	0.389
Wald-p-value (join QE)	0.0400	0.0359	0.6919	0.4050	0.1893	0.0309

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for net purchases. We report only the results where proportional holdings are on average above above 4 % in the PSPP sample . We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100. Debt˙net is in billion of euro.

Table 11: **NON-PSPP SAMPLE: BOND FUND / Fund characteristics.**
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VARIABLES	(1) redem_nav	(2) issuance_nav	(3) leverage_nav	(4) turnover_nav
qe_antic	-0.000675	-0.527	-1.144**	0.0273
	(0.315)	(0.419)	(0.502)	(0.111)
qe_first	-0.375	-0.255	-0.557	-0.112
	(0.380)	(0.449)	(0.663)	(0.128)
qe_second	-0.667	1.562**	-0.736	0.140
	(0.671)	(0.672)	(1.070)	(0.213)
debt_net	-0.000569	0.00137	0.00494***	0.00127***
	(0.00114)	(0.00127)	(0.00176)	(0.000325)
US_long_yield	-0.916	2.101***	-0.493	-0.0111
	(0.696)	(0.664)	(1.076)	(0.211)
us_corp_spread2	-0.0337	1.091***	-0.0994	-0.0471
	(0.181)	(0.182)	(0.203)	(0.0550)
us_vix_vol	0.111**	0.197***	0.0462	0.0218*
	(0.0454)	(0.0525)	(0.0767)	(0.0127)
L.redem_nav	0.0137	-0.0259	0.248*	-0.0565
	(0.0421)	(0.0297)	(0.143)	(0.0542)
Observations	2,932	2,914	2,866	2,934
Number of frfundkey	379	377	378	379
AR1-p-value	3.42e-08	1.69e-07	0.0464	1.71e-06
AR2-p-value	0.377	0.371	0.497	0.552
Hansen-J-p-value	0.0472	0.0819	0.0474	0.0127
Wald-p-value (join QE)	0.5825	0.0000	0.6992	0.0547

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for fund characteristics. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100.

Table 12: **NON-PSPP SAMPLE: MIXED FUND / Fund Characteristics.**
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VARIABLES	(1) redem_nav	(2) issuance_nav	(3) leverage_nav	(4) turnover_nav
qe_antic	0.346	0.408	-0.278	0.0594
	(0.265)	(0.270)	(0.425)	(0.0949)
qe_first	0.193	0.715**	-0.0826	0.0467
	(0.296)	(0.327)	(0.548)	(0.119)
qe_second	0.668	0.988*	0.974	0.0970
	(0.432)	(0.525)	(1.033)	(0.153)
debt_net	0.00200**	0.00215**	0.00152	0.000716***
	(0.000863)	(0.000920)	(0.00209)	(0.000278)
US_long_yield	0.0254	1.662***	-0.272	-0.182
	(0.443)	(0.585)	(1.128)	(0.173)
us_corp_spread2	-0.00190	0.435***	0.0841	0.0902*
	(0.128)	(0.128)	(0.206)	(0.0469)
us_vix_vol	0.0104	0.0154	0.0358	0.00530
	(0.0256)	(0.0305)	(0.0426)	(0.00816)
L.dep_nav	-0.115**	-0.0389*	0.346**	-0.170***
	(0.0478)	(0.0203)	(0.177)	(0.0566)
Observations	3,051	3,047	3,030	3,059
Number of frfundkey	415	415	414	416
AR1-p-value	2.73e-05	6.43e-09	0.0724	0.00387
AR2-p-value	0.00672	0.356	0.595	0.106
Hansen-J-p-value	0.0397	0.456	0.159	0.0143
Wald-p-value (join QE)	0.1908	0.0906	0.2102	0.7990

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for fund characteristics. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100.

Table 13: **NON-PSPP SAMPLE: OTHER FUNDS / Fund characteristics.**
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	(1)	(2)	(3)	(4)
VARIABLES	redem_nav	issuance_nav	leverage_nav	turnover_nav
qe_antic	0.553**	0.156	-8.095***	0.182*
	(0.278)	(0.400)	(2.463)	(0.0932)
qe_first	0.0524	0.0546	-8.426***	0.281**
	(0.426)	(0.403)	(3.193)	(0.122)
qe_second	-0.346	0.499	-25.13***	0.259
	(0.665)	(0.628)	(6.627)	(0.161)
debt_net	0.000915	0.00237*	-0.0208**	0.000202
	(0.000836)	(0.00136)	(0.00968)	(0.000288)
US_long_yield	-1.654***	0.611	-23.47***	-0.118
	(0.629)	(0.754)	(5.176)	(0.170)
us_corp_spread2	0.0426	0.521***	-3.492**	0.0373
	(0.189)	(0.153)	(1.421)	(0.0491)
us_vix_vol	-0.0104	0.0426	0.707**	0.0209*
	(0.0340)	(0.0324)	(0.319)	(0.0109)
L.dep	-0.0385	-0.0539	0.568***	-0.177***
	(0.0459)	(0.0392)	(0.0452)	(0.0572)
Observations	2,617	2,611	2,474	2,619
Number of frfundkey	319	318	313	319
AR1-p-value	2.37e-09	4.12e-07	3.74e-07	0.000192
AR2-p-value	0.706	0.685	0.0104	0.802
Hansen-J-p-value	0.00254	0.000329	2.54e-05	0.0228
Wald-p-value (join QE)	0.5115	0.4594	0.0001	0.0693

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table reports panel regression results for the model described in Equation (1) for fund characteristics. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100.

Table 14: **PSPP SAMPLE: Net Purchases / Maturity.**
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| | (1) | (2) | (3) | (4) |
VARIABLES	less1year	less2year	more2year	perp
qe_antic	-1.316**	0.259*	-0.626	0.000528
	(0.619)	(0.133)	(1.020)	(0.000671)
qe_first	0.0804	0.479**	-1.051	0.000560
	(0.947)	(0.232)	(1.410)	(0.000586)
qe_second	-0.840	0.369	-3.577*	0.000631
	(1.679)	(0.268)	(1.991)	(0.000671)
debt_net	-0.00140	-0.000278	-0.00944**	1.36e-06
	(0.00250)	(0.000477)	(0.00372)	(1.68e-06)
US_long_yield	-0.944	0.466*	-0.572	0.00105
	(1.503)	(0.252)	(2.009)	(0.00104)
us_corp_spread2	0.559**	0.237***	0.112	-0.000129
	(0.243)	(0.0726)	(0.657)	(0.000319)
us_vix_vol	0.0847	-0.0164	-0.0492	4.21e-05
	(0.0718)	(0.0167)	(0.133)	(3.81e-05)
L.dep	-0.295***	-0.247***	-0.0873	0.309***
	(0.0652)	(0.0430)	(0.0800)	(0.110)
Observations	1,338	1,338	1,343	1,331
Number of frfundkey	174	174	174	173
AR1-p-value	0.00131	0.00161	0.000172	0.496
AR2-p-value	0.0155	0.0891	0.0866	0.346
Hansen-J-p-value	0.177	0.0339	0.281	0
Wald-p-value	1.24e-07	4.99e-10	0.000359	0

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

This table reports panel regression results for the model described in Equation (2) for net purchases. We subtract from the variables the mean of the period Q12014 - Q32014. Coefficient estimates are scaled by 100.