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SUSTAINABLE MUTUAL FUNDS THROUGH THE COVID-19.
EVIDENCE FROM FIXED INCOME FLOWS TO EURO AREA

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Sustainable mutual funds through the COVID-19. Evidence from fixed income flows to euro area.*

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Abstract

This paper studies all open-end active mutual funds investing in euro area fixed income, taking into account the relative ESG risk exposure. Working with a novel dataset, we identify short-term determinants of individual fund flows towards fixed income euro area, finding that flows significantly react to recent past returns. Sustainable fund flows further respond to government policy intervention to contain the spread of the virus and to monetary policy announcements. We measure investor timing ability with a statistic hereafter referred to as “performance gap” and we find that, regardless of the asset class, gaps remain negative and significant. Sustainable funds exhibit the worst gap respectively equal to -0.21% per year during the COVID-19 crisis and -0.31% per year in the phasing-out period from the pandemic. Moreover, computing a simple time-weighted strategy with ESG funds, we find that buying and holding the index during the COVID-19 pandemic remains superior, even after controlling for risk, providing support against a popular hypothesis.

Keywords: Mutual funds, Market-timing, Sustainable investing

JEL Classification: G11, G23, G4, Q56

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1 Introduction

Mutual funds represent the most relevant channel for managed savings account in the euro area particularly among non-professional investors. During the COVID-19 pandemic, in light of increased valuation uncertainty and of the instability of return on a daily basis, funds experienced a period of intense withdrawals with the redemption stress subsiding only after the intervention of Central banks. In the midst this scenario, asset managers are emerging as a key contributors to the transition of the euro area towards a more sustainable economy by Environmental, Social, and Governance (ESG) factors in their investment processes. This paper studies the performance of all open-end funds that invest in euro area fixed income taking into account the relative ESG risk exposure of each fund and shedding light on the performance of short-term market-timing strategies effectively used by investors through the COVID-19 pandemic.

Despite an increasing number of concerns about ESG investments as, for example, those related to greenwashing and the evolving regulatory environment, according to [Morningstar \(2023\)](#), the last five-year period has seen a dramatic growth in investment attitudes considering assets' ESG characteristics, and by the end of 2022, sustainability-focused funds had more than US\$ 2.5 trillion in global assets under management. Europe, in particular, represents the largest market for sustainable funds with 83% of global sustainable fund assets, remaining by far the most developed and diverse ESG market. Concerning asset allocation, [European Fund and Asset Management Association \(2022\)](#) reports that, at the end of 2021, bonds accounted for 36% of the assets managed in Europe, compared with 33% of equity. Fixed income investment reached its peak in 2018 weighting for the 40% of the total of European assets under management¹. The predominance of fixed income instruments reflects the relevance of European institutional clients, which generally consider bonds as safe instruments for preserving capital, generating income and meeting regular obligations. This growth, however, has not shielded ESG investing from the multiple shocks rippling through the global economy and by change in monetary policy stance in advanced economies. In fact, in the first semester of 2022, global assets under management in ESG strategies fell by 20%, mirroring the industry-wide trend². The downward pressure on fees, investor preference for cheaper index-tracking products and the race to keep up with the latest technology contribute to make the fund-management industry even more challenging. According to the survey report by [Capital Group \(2023\)](#), a significant majority of investors who have adopted ESG firmly believe that it has the potential to enhance returns. However, in 2022, the ten

¹The remainder of the portfolios are made up of money market, cash equivalents and other assets.

²In terms of volumes, while global non-dedicated ESG strategies experienced a net outflow of US\$ 1,144 billion over the period, ESG strategies posted only a slight outflow of US\$ 8 billion.

largest ESG funds by assets have all posted double-digit losses, with eight of them falling even more than the S&P 500's 14.8% decline (*Bloomberg, December 7, 2022*).

The intuition that ESG investors are willing to pay a higher fee to invest in funds with ESG mandate was explored by *Baker et al. (2022)* that interpret fees for ESG-oriented index funds to conclude that investors are willing to pay an average of 20 basis points³. The performance of ESG funds was analyzed by *Pastor and Vorsatz (2021)* that study the performance and flows of U.S. active equity mutual funds during the COVID-19 crisis. They find that funds with high sustainability ratings and higher star ratings perform better and that most active funds underperform passive benchmarks, contradicting a popular hypothesis⁴. Their work leaves plenty of room for research about the performance of fixed income funds.

Working with a novel dataset at daily frequency, this paper studies performance-flows relationship of fixed income investors in euro area, taking into account the relative ESG risk exposure of each fund. We find that all investment flows are driven by recent past return suggesting evidence of well-established market-timing strategies for fixed income investors. We further identify short-term determinants of individual fund flows towards ESG fixed income euro area, finding that flows significantly respond to government policy intervention to contain the spread of the virus and to monetary policy announcements. We measure investor timing ability with a statistic hereafter referred to as “performance gap”. We find that the average performance gap, defined as the money-weighted return minus the time-weighted return, is negative and statistically significant for all funds, with sustainable funds exhibiting the worst gap respectively equal to -0.21% per year during the COVID-19 crisis and -0.31% per year in the phasing-out period from the pandemic. Moreover, computing a simple time-weighted strategy carried out with ESG fixed income funds, we find that buying and holding the index during the COVID-19 pandemic remains superior, even after controlling for risk. In particular, the time-weighted strategy for ESG market index with a holding period of 120 business days is positive and superior, by almost 1 percent point (0.91%) per year, with respect to the cross-sectional average of ESG funds.

This paper relates to two strands of literature. First, it contributes to the fast growing economic literature that studies investment flows towards sustainable funds through the COVID-19 pandemic. *Döttling and Kim (2022)*, using COVID-19 as an economic shock, show that funds with higher sustainability ratings experienced sharper declines in retail

³*Giglio et al. (2023)* analyze survey data on ESG beliefs and preferences in a large panel of retail investors, documenting that investors generally expected ESG investments to underperform the market. *Pastor et al. (2021)* model investing that considers ESG criteria and they find that, in equilibrium, green assets have low expected returns because investors enjoy holding them and because green assets hedge climate risk.

⁴The hypothesis that investors are willing to tolerate underperformance of the active mutual funds because of their ability to hedge against recessions was formulated, among the others, by *Moskowitz (2000)* and *Glode (2011)*.

flows during the pandemic. [Fang and Parida \(2022\)](#) study the performance and flows of sustainable equity mutual funds in recent years through the COVID-19 pandemic. They find that the high-sustainable funds perform better than the low-sustainable ones and that out-performance significantly increases during the COVID-19 pandemic-induced market crash and the post-crash pandemic. Concerning ESG fixed income funds, [Falato et al. \(2021\)](#) investigate outflows from corporate-bond funds through the COVID-19, [Ma et al. \(2022\)](#) identify fixed income mutual funds as an important contributor to the unusually high selling pressure in liquid asset markets during the COVID-19 crisis and [Jiang et al. \(2022\)](#), working with open-end corporate bond mutual funds and using the COVID-19 crisis as a natural experiment, find that bonds with higher pre-crisis fragility experienced more negative returns. We contribute to this area of analysis identifying short-term determinants of individual fund flows towards ESG fixed income euro area and providing evidence of the underperformance of active sustainable funds against passive benchmarks during the pandemic.

Second, a large body of literature analyzes the empirical finding that investors' decisions tend to time the market⁵. [Giglio et al. \(2021\)](#), working on survey administered to a large panel of retail investors, find a robust relationship between beliefs and portfolio allocations. Their results mirror findings from a literature that has documented how individuals extrapolate from their own experience when forecasting future economic outcomes. For example, [Greenwood and Shleifer \(2014\)](#) argue that investor expectations of future stock market returns, in the period 1963-2011, tend to be extrapolative: that is, they are correlated with past stock returns and with the level of the stock market. They also find that investor expectations are highly correlated with investor inflows into mutual funds, and negatively correlated with model-implied expectations. A market-timing strategy is not *ex-ante* doomed to fail, particularly in volatile markets⁶. Therefore, [Ferreira et al. \(2019\)](#) test how a return-chasing may be, in principle, a profitable strategy and they find that competitiveness of the industry explains the variation in performance persistence⁷. We contribute to this literature by studying the individual profitability of market-timing strategies in euro area fixed income with high granularity of data.

The remainder of the paper is organized as follows: section (2) presents data, section (3) identifies flows determinants, section (4) measures investor performance, section (5) reports robustness checks and section (6) concludes.

⁵Early works belonging to this area include, among others, [Friesen and Sapp \(2007\)](#), [Frazzini and Lamont \(2008\)](#), [Bailey et al. \(2011\)](#), [Ferreira et al. \(2012\)](#) and references therein.

⁶Among the others, [Cochrane \(2011\)](#) shows that if returns are somewhat predictable, by timing the market investors may be able to achieve higher Sharpe ratios.

⁷With a similar methodology [Cagnazzo \(2022\)](#) empirically investigates the performance of market-timing strategies effectively used by investors in Emerging Markets finding that the average performance gap is negative and statistically significant for all funds.

2 Data

We obtain fund-level data from Bloomberg at daily frequency with an interval spanning December 2017 through June 2023. We select primary share class open-end active funds denominated in euro (EUR) investing in ‘fixed income - euro area’ and we keep track of funds that declare investments according to ESG criteria. Since investment companies tend to liquidate funds with poor performance, particularly after substantial redemptions from investors, we control for survivorship bias. We therefore include funds expired at some point during the sample period, as well as those in business at the end of the interval. To ensure the accuracy of the analysis, we keep only funds existing for at least 90 consecutive business days during the sample period.

The resulting dataset contains 1,504,191 daily observations across 767 unique funds, of which 165 meet ESG sustainability criteria⁸. At June 2023 the dataset covers net assets under management equal to EUR 221.14 billion, of which EUR 99.87 billion refers to ESG funds⁹. The sample shows the relevance of ESG instruments that, at the end of the interval, weight for the 21.5% of the euro area fixed income market in terms of number of funds and for the 45.2% in terms of net assets under management.

In order to better evaluate the resulting dataset, we compare it with the corresponding sample investing in ‘equity - euro area’¹⁰. At June 2023 equity funds are 617, of which 195 invest according to ESG criteria, with aggregate net assets under management equal to EUR 135.02 billion of which EUR 60.80 billion refers to ESG funds. The comparison highlights that, at the end of the sample, the euro area non-ESG fixed income market is larger than equity and, although ESG fixed income funds are slightly lower in number, the corresponding net assets under management remains well above the equity level by almost EUR 40 billion. Table (1) reports the number of funds by size, type of instrument, area of domicile and object of investment for the last observation of each year.

The inspection of table (1) shows that, while the number of active non-ESG funds has been gradually decreasing, respectively from 509 in 2017 to 375 in 2023, ESG funds report an almost steady increase, from 113 in 2017 to 136 in 2023, reaching a peak of 144 funds in 2021. Sizes are set with respect to Total Net Asset (TNA) and are defined as follows:

⁸We exclude from the sample closed-end funds, exchange-trade products and funds-of-funds. The resulting dataset is made by Mutual Funds (MF), Sociétés d’Investissement à Capital Variable (SICAV) and open-end Pension Funds (PF). The [Appendix](#) reports the fund list in alphabetical order.

⁹The aggregate asset under management reached its peak in November 2021 with EUR 253.18 billion of which, EUR 116.70 billion assets were managed according to ESG criteria.

¹⁰[Capital Group \(2023\)](#) reports that global investors identify equities and bonds as the the most popular asset classes used to gain exposure towards ESG factors, respectively weighting for the 81% and 58%. Question: *For which asset classes and sectors have you implemented ESG?*, multiple answers allowed.

Table 1: Sample

	n	Size			Type of fund			Area of domicile			Object of investment		
		Small	Medium	Large	MF	SICAV	PF	NE	WE	SE	Govern.	Corporate	Aggregate
ESG funds													
2017	113	14	54	45	49	64	1	1	110	2	8	42	63
(% of total)		(12.4)	(47.8)	(39.8)	(42.5)	(56.6)	(0.9)	(0.9)	(97.3)	(1.8)	(71.)	(37.2)	(55.8)
2018	103	12	46	45	45	57	1	4	98	1	4	46	53
(% of total)		(11.7)	(44.7)	(43.7)	(43.7)	(55.3)	(1.0)	(3.9)	(95.1)	(1.0)	(3.9)	(44.7)	(51.5)
2019	113	14	52	47	54	58	1	4	108	1	7	44	62
(% of total)		(12.4)	(46.0)	(41.6)	(47.8)	(51.3)	(0.9)	(3.5)	(95.6)	(0.9)	(6.2)	(38.9)	(54.9)
2020	112	12	47	53	48	63	1	4	107	1	8	49	55
(% of total)		(10.7)	(42.0)	(47.3)	(42.9)	(56.3)	(0.9)	(3.6)	(95.5)	(0.9)	(7.6)	(34.5)	(56.9)
2021	144	16	67	61	67	74	3	7	135	2	11	51	82
(% of total)		(11.1)	(46.5)	(42.4)	(46.5)	(51.4)	(2.1)	(4.9)	(93.8)	(1.4)	(7.6)	(35.4)	(56.9)
2022	138	17	60	61	64	70	4	7	129	2	10	47	81
(% of total)		(12.3)	(43.5)	(44.2)	(46.4)	(50.7)	(2.9)	(5.1)	(93.5)	(1.4)	(7.2)	(34.1)	(58.7)
2023	136	18	58	60	63	69	4	7	127	2	10	46	80
(% of total)		(13.2)	(42.6)	(44.1)	(46.3)	(50.7)	(2.9)	(5.1)	(93.4)	(1.5)	(7.4)	(33.8)	(58.8)
Non-ESG funds													
2017	509	281	161	67	399	87	23	15	326	168	134	61	314
(% of total)		(55.2)	(31.6)	(13.2)	(78.4)	(17.1)	(4.5)	(2.9)	(64.0)	(33.1)	(26.3)	(12.0)	(61.7)
2018	399	214	127	58	300	78	21	17	246	136	100	45	254
(% of total)		(53.6)	(31.8)	(14.5)	(75.2)	(19.5)	(5.3)	(4.3)	(61.7)	(34.1)	(25.1)	(11.3)	(63.7)
2019	381	197	126	58	283	78	20	16	245	120	86	46	249
(% of total)		(51.7)	(33.1)	(15.2)	(74.3)	(20.5)	(5.2)	(4.2)	(64.3)	(31.5)	(22.6)	(12.1)	(65.4)
2020	358	180	118	60	260	80	18	16	243	99	77	44	237
(% of total)		(50.3)	(33.0)	(16.8)	(72.6)	(22.3)	(5.0)	(4.5)	(67.9)	(27.7)	(21.5)	(12.3)	(66.2)
2021	410	202	146	62	313	79	18	17	287	106	89	49	272
(% of total)		(49.3)	(35.6)	(15.1)	(76.3)	(19.3)	(4.4)	(4.1)	(70.0)	(25.9)	(21.7)	(12.0)	(66.3)
2022	389	189	137	63	298	73	18	16	273	100	83	48	258
(% of total)		(48.6)	(35.2)	(16.2)	(76.6)	(18.8)	(4.6)	(4.1)	(70.2)	(25.7)	(21.3)	(12.3)	(66.3)
2023	375	174	136	65	290	74	11	18	273	84	84	46	245
(% of total)		(46.4)	(36.3)	(17.3)	(77.3)	(19.7)	(2.9)	(4.8)	(72.8)	(22.4)	(22.4)	(12.3)	(65.3)

This table reports the number of active funds for the full sample. For the last observation of each year, we report the number of funds by size, by type of fund, by area of domicile and by style of investment. Sizes are set with respect to TNA and are defined as follows: small, $TNA < 100$ mn EUR; medium, $TNA < 500$ mn EUR; otherwise funds are considered as large. MF and PF respectively stand for mutual funds and pension funds. NE, WE and SE respectively stand for Northern Europe, Western Europe and Southern Europe. Object of investment are: government, corporate and aggregate. Percentages of the totals are reported in parentheses. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

small, $TNA < 100$ mn EUR; medium, $TNA < 500$ mn EUR; large, otherwise. Small non-ESG funds show a slight predominance, weighting for the 55.2% of their total in 2017 and 46.4% in 2023. On the other hand, concerning the ESG sample, medium and large funds weight more, respectively for the 47.8% and 39.8% in 2017 and for the 42.4% and 44.1% at the end of the interval.

The majority of instruments in the sample are mutual funds (MF) and SICAV, while pension funds (PF) stand respectively below 3% for ESG funds and below 6% for non-ESG instruments. For both subsamples, the large majority of entities are formally domiciled in Western Europe (WE)¹¹. Interestingly, data show that a large non-ESG fixed income market is well

¹¹Countries of domicile are marked as follows. Northern Europe: Denmark, Finland, Great Britain, Ireland

established in SE, weighting between 22.4% to 34.1% of the total, while the same area is not relevant for ESG instruments that have a weight that remains below 2% over time.

Funds may invest in government, corporate or aggregate bonds¹² and managers, both for ESG and non-ESG, declare to invest mainly in the latter. Concerning the other two categories of investment, while non-ESG funds mainly invest in euro area government bonds, weighting between 21.3% to 26.3% through time, the second larger category for ESG funds are corporate investments spanning through time between 33.8% to 44.7%.

For each fund we collect TNA, Total Return (TR)¹³ and we obtain fund characteristics such as fees and age. For each ESG fund we obtain the Morningstar sustainability rating (in globes) and the Morningstar sustainability risk score¹⁴ as of June 30, 2023. Higher ratings indicate that a fund, on average, invests in fewer companies or sovereign debt with a high ESG risk, under *Sustainalytics*' ESG Risk and Country Risk methodologies, being exposed to less risk driven by E, S or G factors. Higher risk scores correspond to a higher ESG risk level.

For fund i we compute net daily individual return at time t ($r_{i,t}$) as $r_{i,t} = TR_{i,t}/TR_{i,t-1} - 1$. Individual flows are set in levels ($Flow_{i,t}$), under the hypothesis that each flow is dated at the end of each business day. Thus, the daily net cash flow for fund i in day t is:

$$Flow_{i,t} = TNA_{i,t} - TNA_{i,t-1}(1 + r_{i,t}). \quad (1)$$

Table (2) reports selected summary statistics for the sample we study.

First, table (2) shows that ESG funds are on average larger, younger and cheaper in terms of fees. Total net asset managed by ESG fixed income funds in 2017 is on average slightly higher than half a billion euro (EUR 528.22 million) and reaches EUR 734.34 million in 2023. In both years the variable is two-times higher than that of the corresponding non-ESG sample, respectively equal to EUR 257.33 million and EUR 323.39 million. ESG funds are on average less than 12 years old, while ages for non-ESG funds at the end of the sample overcomes 19 years. This highlights the presence of well-established fixed income funds in the European market well before the more recent mushrooming of ESG financial instruments.

and Sweden. Western Europe: Austria, Belgium, France, Germany, Luxembourg, Lichtenstein, Netherlands and Switzerland. Southern Europe: Greece, Italy, Malta, Portugal, San Marino and Spain.

¹²Aggregate bonds include both government and corporate securities.

¹³Individual flows that account for dividend reinvestment can be correctly computed since, for each fund in the sample, TR is different to Net Asset Values (NAV).

¹⁴[Morningstar sustainability rating](#) is designed to support investors in evaluating the relative environmental, social, and governance risks within portfolios. Ratings are determined using bottom-up assessments of the underlying holdings within a portfolio. The output of the rating is a category of 1 to 5 globes for each eligible portfolio, whereby a higher number of globes indicates that the portfolio has lower ESG risk. The Morningstar sustainability risk score is measured with respect to the Assets Under Management distribution of holdings (long positions only) in medium ESG risk classification.

Table 2: Descriptive statistics

Fixed income	n	TNA (EUR mn)	Monthly net flows (EUR mn)	Turnover (%)	Age (years)	Fee (%)	Excess return (%)	Std. error (%)	Five-Factor alpha (%)	Std. error (%)	Volatility (%)
ESG funds											
2017	113	528.22	3.72	1.78	10.18	0.53	-0.24	(0.01)	-	-	-
2018	103	329.77	-12.09	1.04	10.17	0.49	-0.04	(0.01)	-0.17	(0.01)	0.06
2019	113	420.85	-2.97	1.41	10.80	0.51	-0.39	(0.01)	0.02	(0.01)	0.10
2020	112	608.90	9.56	1.22	11.22	0.48	0.08	(0.01)	0.03	(0.01)	0.07
2021	144	800.98	10.39	1.07	11.27	0.50	-0.21	(0.01)	-0.05	(0.01)	0.12
2022	138	695.13	16.72	2.33	11.31	0.47	-2.48	(0.02)	-0.29	(0.01)	0.32
2023	136	734.34	20.63	1.41	11.74	0.47	-0.48	(0.01)	-0.06	(0.01)	0.22
Non-ESG funds											
2017	509	257.33	-1.32	2.09	14.93	0.63	-0.37	(0.01)	-	-	-
2018	399	269.05	-1.69	2.01	15.71	0.63	-0.05	(0.01)	-0.34	(0.01)	0.05
2019	381	306.57	2.48	2.04	16.48	0.63	-0.30	(0.01)	0.06	(0.01)	0.06
2020	358	335.94	-2.63	2.56	17.47	0.60	0.11	(0.01)	0.25	(0.01)	0.05
2021	410	315.87	-1.74	2.39	18.57	0.60	-0.19	(0.01)	-0.01	(0.01)	0.09
2022	389	285.25	1.73	2.28	19.23	0.57	-1.99	(0.02)	-0.43	(0.01)	0.24
2023	375	323.39	1.97	1.77	19.67	0.56	-0.30	(0.01)	-0.10	(0.01)	0.14

This table reports summary statistics of the full sample. For the last observation of each year, we report the number of active funds and we calculate the cross-sectional averages of the following fund characteristics: TNA (in EUR million), monthly net flow (in EUR million), yearly turnover (in %), fund age (in years), management fee (in %), monthly excess return (in %), five-factor model-adjusted monthly return in the preceding 36 months (alpha, in%), standard deviation of monthly returns in the 12 months prior to each observation (volatility, in %). Standard errors (in %) referring to excess returns and to five-factor alphas are in parentheses. Yearly individual turnovers are computed as the minimum of purchase or sale of each fund during each year, divided by the TNA of the fund during the same period. Monthly excess returns are computed with respect to the 30-day Euribor. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

Overall fees, stated by fund managers, are lower for ESG funds, on average, by 0.1%.

Second, ESG funds show substantial inflows after 2020 and exhibit higher monthly net flow volatility, especially in years of financial distress. In fact, while non-ESG funds exhibit flows standing, in absolute value, below EUR 2.7 million, ESG funds show increasing monthly net inflows after 2020, respectively equal to EUR 9.56, 10.39, 16.72 and 20.63 million.

Third, excess returns do not show any significant heterogeneity in the two subsamples, even after correcting for risk exposures. For the ESG sample excess returns span between -2.48% in 2022 and 0.08% in 2020 and, in the same years non-ESG funds show respectively -1.99% and 0.11%. Cross-sectional averages of risk-adjusted returns (alphas) in the preceding 36 months, computed according to the five-factor model of [Fama and French \(2014\)](#)¹⁵, substantially show a similar trend for both samples. In fact, five-factor model alphas are positive in 2019 and

¹⁵Factors refers to Europe and are market portfolio (MKT), size (SMB), book-to-market (HML), momentum (RMW) and strategy (CMA). Factor data are daily from [Kenneth French's data library](#).

in 2020 and negative for the rest of the sample. Corresponding volatility, measured as the standard deviation of monthly returns in the 12-month period prior to each observation, reached its maximum in 2021, respectively equal to 0.24% and 0.32% and its low in 2018.

3 Evidence on market-timing

In this section we investigate whether fund individual flows to fixed income euro area respond to past performance and we further identify their short-term determinants by category of investment. In order to verify the existence of a well-established flow-performance relation, for each fund in the sample we compute, at daily frequency, weekly net flows as the unweighted sum of daily net flows registered in the previous 5 business days and average excess returns on a weekly basis as the unweighted average of daily excess return in the previous 5 business days. We therefore estimate the following fund fixed-effect panel regression, with standard errors clustered by date:

$$Flow_{i,t-5 \rightarrow t} = \alpha + \beta_{Ret} r_{i,t-10 \rightarrow t-5} + \beta_{Mkt} Z_t + \beta_{Ch}^T X_{i,t} + \beta_{Ch} \Gamma_i + \beta_{ESG} \Lambda_i + \nu_m + \eta_i + \epsilon_{i,t}, \quad (2)$$

where i indicates the fund, then $Flow_{i,t-5 \rightarrow t}$ is the net flow of a given fund registered between day $t - 5$ and t . The first variable of interest is the average excess return (in %) of the fund between day $t - 10$ and $t - 5$ ($r_{i,t-10 \rightarrow t-5}$). In order to analyze how euro area flows are correlated to market conditions, we include contemporaneous market variables (Z_t). These controls are the aggregate fund flows and the VIX index as indicators of the market volatility. We also include ECB announcements, measured as a dummy variables that takes 1 the day in which a meeting of the Governing Council takes place and 0 otherwise¹⁶. Finally, in order to verify how fund flows respond to the current economic sentiment, we control for lockdown measures applied by European governments to contain the spread of the virus during the pandemic crisis. We therefore include stringency indexes, released by Oxford University, for the three largest economies of the euro area: Germany, France and Italy¹⁷.

¹⁶Aramonte et al. (2020), with a similar methodology, study how the sensitivity of daily returns of open-end mutual funds to aggregate liquidity changes around real-activity macroeconomic announcements.

¹⁷The [stringency index](#) is a composite measure based on publicly available information on a series of indicators of government responses including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100=strictest). The use of the stringency index relies on results by Frazzini and Lamont (2008), Ben-Rephael et al. (2012) and Jiang and Yuksel (2019) that look at mutual fund flows as a measure of individual investor sentiment. More recently, Goel and Dash (2022) investigate the role of government policy interventions on the investor sentiment amid the early spread of COVID-19 finding that government policy responses have a moderating role in the investor sentiment and stock returns relationship.

The time-dependent characteristic of each fund ($X_{i,t}$) is size, measured by the natural log of fund TNA in euro, and the time-invariant fund characteristics is the management stated fee, in % (Γ_i). For ESG funds, the Morningstar sustainability rating and Morningstar sustainability risk are included (Λ_i). ν_y and η_y are the month and fund-level fixed effects. We run regression (2) separately by category of investment and table (3) reports results of different specifications.

Table 3: Market-timing of fund flows

	ESG funds						Non-ESG funds					
	(1.a)	(2.a)	(3.a)	(4.a)	(5.a)	(6.a)	(1.b)	(2.b)	(3.b)	(4.b)	(5.b)	(6.b)
Excess return (lagged)	1.55*** (3.28)	1.55*** (3.33)	1.52*** (3.18)	1.54*** (3.27)	1.52*** (3.33)	1.77*** (3.18)	0.38*** (3.61)	0.37*** (3.59)	0.37*** (3.58)	0.37*** (3.63)	0.37*** (3.60)	0.38*** (3.59)
Aggregate flows	0.01*** (4.37)	0.01*** (4.35)	0.01*** (4.37)	0.01*** (4.37)	0.01*** (4.35)	0.01*** (4.37)	0.01*** (4.85)	0.01*** (4.87)	0.01*** (4.87)	0.01*** (4.86)	0.01*** (4.88)	0.01*** (4.88)
VIX	-0.02*** (-2.63)	-0.02*** (-3.13)	-0.02*** (-2.73)	-0.01*** (-2.42)	-0.02*** (-2.92)	-0.02*** (-2.53)	-0.01*** (4.85)	-0.01** (-1.88)	-0.01** (-2.14)	-0.01** (-2.05)	-0.01** (-1.86)	-0.01** (-2.11)
ECB announc.	0.46** (2.22)	0.46** (2.23)	0.47** (2.26)	0.46** (2.22)	0.47** (2.23)	0.46** (2.26)	0.02 (0.64)	0.02 (0.64)	0.02 (0.63)	0.02 (0.65)	0.02 (0.64)	0.02 (0.64)
Stringency Germany	0.01* (1.96)			0.01* (1.58)			0.01 (0.84)			0.01 (0.81)		
Stringency France		0.01*** (3.04)			0.01*** (2.64)			0.01 (0.61)			0.01 (0.57)	
Stringency Italy			0.01** (1.97)			0.01** (1.87)			0.01 (0.53)			0.01 (0.49)
Size	0.75*** (2.72)	0.75*** (2.78)	0.77*** (2.78)	0.89** (2.35)	0.89** (2.27)	0.90** (2.27)	0.01** (1.98)	0.01** (1.96)	0.01** (1.95)	0.01** (1.98)	0.01** (1.96)	0.01** (1.95)
Fee	-0.35 (-1.21)	-0.35 (-1.22)	-0.35 (-1.21)	-	-	-	-0.09** (-2.31)	-0.10** (-2.31)	-0.10** (-2.31)	-	-	-
Sustainability globes	0.69*** (2.81)	0.60*** (2.84)	0.70*** (2.84)	-	-	-	-	-	-	-	-	-
Sustainability risk	-0.03** (-1.91)	-0.03** (-1.94)	-0.03** (-1.94)	-	-	-	-	-	-	-	-	-
Constant	-5.03*** (-3.13)	-4.99*** (-3.13)	-5.07*** (-3.20)	-5.35** (-2.16)	-5.31** (-2.17)	5.41** (-2.21)	0.16** (2.34)	0.15*** (2.21)	0.15*** (2.26)	0.11** (1.97)	0.10* (1.78)	0.11* (1.88)
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund fixed effect	No	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Observations	85,272	85,272	85,272	85,272	85,272	85,272	340,093	340,093	340,093	340,093	340,093	340,093
Adj. R-squared	0.158	0.158	0.158	0.096	0.096	0.096	0.153	0.159	0.156	0.106	0.115	0.111
Wald test High = Low (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents the results of panel regressions examining the market-timing ability of investors on euro area fixed income funds. The dependent variable is weekly fund flows, computed as the sum of flows in previous 5 business days (in EUR million). Lagged variables include: the average of the excess returns of the past 5 days (in %). Market control variables (Z_t) include the aggregate fund flows, the VIX index, the ECB announcement, measured as a dummy variables taking 1 for the day in which a meeting of the Governing Council takes place and the stringency indexes for Germany, France and Italy released by Oxford University. Time-dependent control variables for each fund ($X_{i,t}$) include: fund size, measured by the natural log of fund TNA in euro. Time-invariant control variables for each fund (Γ_i) include: fund manager stated fee (in %). Further controls for ESG funds (Λ_i) include: Morningstar Sustainability Rating in 'globes' and Morningstar sustainability risk. Standard errors are clustered by date, and t-statistics are in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent level, respectively. Month and fund fixed effects are included, but the coefficients are not shown. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

Table (3) shows that the β_{Ret} coefficient is positive and statistically significant for both asset allocations. This suggests that, after a positive excess return in the previous week of

1%, non-ESG funds show an inflow between EUR 0.37 million to EUR 0.38 million, while for ESG funds the inflow is larger and, depending of specification, it stands between EUR 1.52 million and EUR 1.77 million. Therefore, table (3) confirms that in euro area fixed income market, whatever specification we choose, there is statistical significance supporting the flow-performance relationship¹⁸.

Concerning market variables, both the aggregate fund flows and the VIX index coefficients are significant with, respectively, a positive and a negative sign. This confirms that investor behaviors in the euro area fixed income market are sensitive to market trends and market volatility. As far as monetary policy, the ECB announcement coefficient is statistically significant only for ESG funds. This suggests that monetary policy announcements, in the interval of interest, have a significant relation only with fixed income flows towards sustainable funds¹⁹. The evidence that ECB monetary policy affect short-term investors' behavior towards fixed income euro area ESG funds complements results by [Banegas et al. \(2022\)](#). They find that monetary policy shocks have a direct effect on flow dynamics and that an unexpected tightening of the stance of policy is associated with outflows from fixed income funds, in particular those investing in international, government and investment grade bond markets²⁰.

ESG flows show a peculiar behavior also with respect to economic sentiment. In fact Stringency indexes, tested for various economies in alternative specifications, show significant coefficients only for ESG fund flows. Interestingly, these coefficients have a positive sign suggesting that immediately after a period of negative feelings on the economy, measured in terms of government policy interventions, investors tend to move towards the ESG fixed income market. This finding is in line with [Agoraki et al. \(2023\)](#) showing that stringency is also positively associated with green investment funds, particularly for negative returns.

Turning to the other coefficients in regression (2), in all specifications the loadings on the size, are highly significant and positive, as expected. In fact, consistently with [Ferreira et al. \(2012\)](#), the dimension of the fund is positively correlated with net individual flows. In specifications (1.a) (1.b) (2.a) (2.b) (3.a) and (3.b) we do not include fund fixed effect in order to add time-invariant control variables. Coefficients for overall fees are significant only for non-ESG funds suggesting the ESG flows do not respond to management costs²¹. This may

¹⁸In alternative specifications we use the compounded excess return on weekly basis instead of the average excess return and findings remain substantially unaltered.

¹⁹In alternative specifications we include only ECB announcements for which the data releases deviate the most from consensus expectations, finding that results remain robust.

²⁰Relationships between monetary policy and developments in the fund industry are explored by [Bubeck et al. \(2018\)](#), [Hespeler and Suntheim \(2020\)](#), [Peksevım and Ercan \(2022\)](#), [Ciminelli et al. \(2022\)](#) and [Adrian et al. \(2023\)](#).

²¹We also estimate a model where we include front-load fee instead of total management fee with unaltered

find an explanation on the fact that fees for the ESG market are sensibly lower than those of the non-ESG instruments.

Finally, ESG flows show that coefficient for Morningstar sustainability rating and for Morningstar risk and significant and respectively positive and negative, as expected. This suggest that fixed income funds with higher ESG rating and with lower risk attract higher inflows. In specifications (4.a), (5.a), (6.a), (4.b), (5.b) and (6.b) we include both month and fund fixed effect and results remain robust.

4 Measuring investor strategies

In section (3) we find that the individual flows into and out of euro area fixed income funds quickly respond to past performance and to short-term determinants, therefore for each fund we use observed cash flows in order to measure a market-timing (i.e. money-weighted) strategy. Conversely, a time-weighted strategy invests EUR 1 at the beginning of period t in a fund, holding the investment for h days and reinvesting any accrued dividend. In the baseline simulations we set the investment horizon to 120 business days ($h = 120$). We denote with $\bar{r}_{i,t \rightarrow t+h}^{TW}$ the time-weighted net geometric excess return of an $t, t + h$ investment in day t with an horizon of h days:

$$\bar{r}_{i,t \rightarrow t+h}^{TW} = \left[\prod_{j=1}^h (1 + r_{i,t+j}) \right]^{1/h} - 1, \quad (3)$$

where $r_{i,t}$ represents the net return of fund i between day $t-1$ to t . This measures the net return of the fund manager, or equivalently, the buy-and-hold return on EUR 1 invested over the holding period. Money-weighted is instead an active market-timing strategy that invests every day in fund i , and with a holding period of 120 business days, an amount of resources equal to the net flows into that fund. Outflows are considered as dividend distributions, and inflows as additional investments. Since money-weighted requires buying and selling fund shares, investors are charged by entry/exit fees. Hereafter we abstract from these transaction costs that are likely to reduce the profitability of a money-weighted strategy. We estimate the performance of the money-weighted strategy through its internal rate of return (IRR). In particular, for each fund, we compute the net rate of return that solves the following equation:

$$TNA_{i,t} = - \sum_{j=1}^h \frac{Flow_{i,t+j}}{(1 + \bar{r}_{i,t}^{MW})^j} + \frac{TNA_{i,t+h}}{(1 + \bar{r}_{i,t}^{MW})^j}, \quad (4)$$

findings.

where TNA_t (i.e. the value for total net asset under management at time t), is the initial size of the investment, $Flow_{t+j}$, with $j = 1, \dots, h$, are the net flows in and out each fund²², and TNA_{t+h} is the final value of the investment. Since flows take both positive and negative values, the IRR is not necessarily unique, or real valued. Therefore, we follow standard assumptions and, when more than one strictly positive internal rate of return is found, we select the minimum; when no strictly positive internal rate of return is found, but one or multiple negative rates are found, we select the maximum. Since the computation of the IRR, when net flows change sign multiple times, can be difficult, Dietz (1966) suggests the following approximation:

$$\bar{r}_{i,t}^D = \left[\frac{TNA_{i,t+h} - TNA_{i,t} - \sum_{j=1}^h Flow_{i,t+j}}{TNA_{i,t} + \frac{1}{2} \sum_{j=1}^h Flow_{i,t+j}} + 1 \right]^{1/h} - 1. \quad (5)$$

Note that a money-weighted return explicitly accounts for net cash flows into and out of the fund over time, reflecting the average investor performance during the sample period. Therefore we measure the investor timing ability with a statistic hereafter referred to as “performance gap”, defined as the difference between fund money-weighted and time-weighted return:

$$\bar{r}_{i,t}^{PG} = \bar{r}_{i,t}^{MW} - \bar{r}_{i,t}^{TW}. \quad (6)$$

Table (4) reports results by category. Statistics are computed from the time-series of the 1,435 daily cross-sectional averages. Moreover, in order to better evaluate the profitability of a time-weighted strategy, we compute the same strategy for Bloomberg Barclays MSCI Euro Corporate SRI Index and for Morningstar investment grade Eurozone corporate bond index.

In order to evaluate how the performance gap changes in time, we divide the overall sample interval in three sub-intervals. The first concerns the pre-pandemic phase and spans December 2017 through January 1st 2020. The crisis period refers to the peak of the pandemic and covers between January 2nd 2020 to March 22nd 2022. The last interval, referred to as phasing-out, goes from March 24th, when the ECB Governing Council announced to gradually phase out the package of pandemic collateral easing measures in place since April 2020²³. In order to verify the robustness of results, for each fund in the sample we compute, at daily frequency, weekly performance gaps as the unweighted average of daily gaps registered in

²²Note that inflows into a fund have a positive sign. Therefore, in the formula for the IRR we need to multiply flows by -1 .

²³The timeline, implemented from July 8th 2022, is structured in three steps and it will take place until December 2024

the previous 5 business days. Table (4) reports results for all funds by ESG criteria and for each sub-interval.

First, table (4) shows that cross-sectional averages of a simple time-weighted strategy carried out with ESG fixed income funds underperform the corresponding passive benchmarks before and during the COVID-19 pandemic. In particular, panel (A.2) shows that, during the crisis period, the time-weighted strategy for ESG market index is positive (0.36%) and superior, by almost 1 percent point (0.91%) per year, with respect to the cross-sectional average of ESG funds (-0.55%). Panels (B.2) shows similar result for non-ESG funds with the time-weighted strategy of the index equal to 0.28% per year, the cross-sectional average of funds equal to -1.10% per year, and with a annual difference of 1.38%²⁴. Therefore, a simple strategy that buys and holds the index during the COVID-19 pandemic remains superior, even after controlling for risk, since corresponding Sharpe ratios are larger (or less negative) than those computed for the funds. This finding extends to fixed income results by [Pastor and Vorsatz \(2021\)](#) and provides support in contradicting a popular hypothesis that sustainable funds perform well during periods of distress.

Figure (1) plots cross-sectional averages of returns from different strategies during the interval of interest comparing them with relative benchmarks. It shows that strategies are highly correlated among each other. While ESG strategies move quite in lockstep with their benchmark, time-weighted strategies from non-ESG funds seem to be subject to less volatility than the respective market index.

Second, table (4) shows that average returns from money-weighted are always below time-weighted and then the average performance gap is negative in all cases. In particular, panels (A.1) and (A.2) show that, in the pre-crisis period, the average gap, computed with IRR methodology is -0.17% per year for ESG and -0.07% for non-ESG funds. Gaps computed with Dietz formula are a bit smaller in absolute value and respectively equal to -0.16% to -0.05% per year. Due to the return persistence, we also report standard errors that confirm in both cases that the negative performance gap is statistically significant. Sharpe-ratios of time-weighted are always larger (or less negative) than those computed for money-weighted. Therefore, time-weighted strategies are superior even after controlling for risk. We further report the fraction of days in which the average performance gap is strictly negative. Panel (A.1) and (A.2) shows that performance gaps are negative in almost 100% of days.

Figure (2) plots cross-sectional averages of performance gaps. It shows that gaps are negative, regardless of the asset class and the methodology of computation in most of days and that it widens through the pandemic, particularly for non-ESG funds.

Concerning the size of gaps through the COVID-19 pandemic, panels (A.2) and (B.2) of

²⁴Panels (A.1) and (B.1) show similar evidence for the pre-pandemic phase.

Figure 1: Investment strategies

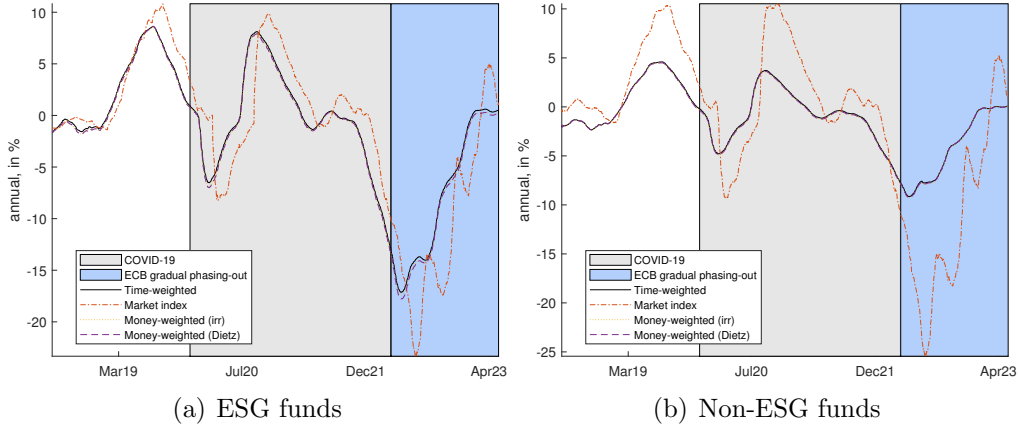


Figure (1) plots cross-sectional averages of returns from different strategies with a holding period of 120 business days. The reported statistics are computed from the time-series of the 1,435 daily cross-sectional averages for each item. Daily time-weighted returns are also computed for Bloomberg Barclays MSCI Euro Corporate SRI Index and for Morningstar investment grade Eurozone corporate bond index. Shaded areas represent respectively the COVID-19 crisis (in grey) and phasing-out from the package of pandemic collateral easing measures, decided by the ECB Governing Council on March 24th, 2022 (in blue). Returns are annual in %. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

Figure 2: Performance gaps

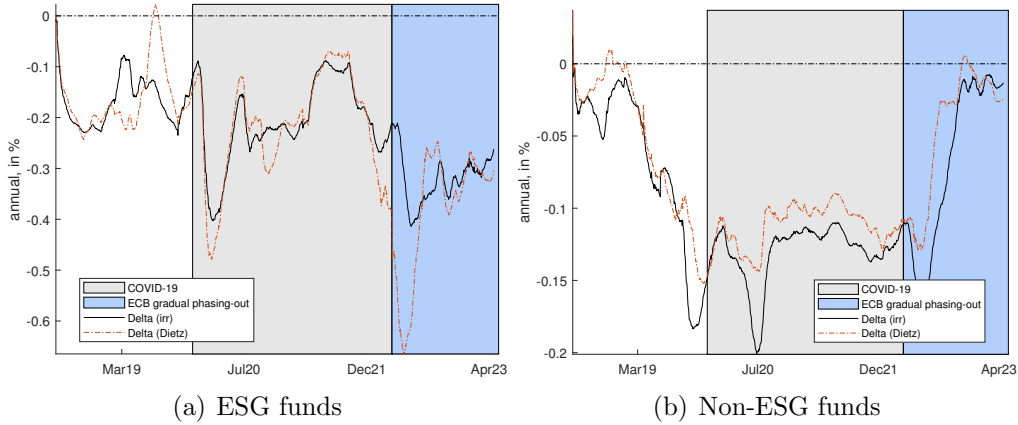


Figure (2) plots cross-sectional averages of performance gaps. Gaps are computed for each fund as the difference between money-weighted returns and time-weighted returns with a holding period of 120 business days. For each strategy the unweighted average of daily gaps registered in the previous 5 business days is reported. The reported statistics are computed from the time-series of the 1,435 daily cross-sectional averages for each item. Shaded areas represent respectively the COVID-19 crisis (in grey) and phasing-out from the package of pandemic collateral easing measures, decided by the ECB Governing Council on March 24th, 2022 (in blue). Returns are annual in %. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

table (4) report negative and larger gaps in all days of the time interval, regardless of the methodology of computation. In fact, gaps computed with IRR methodology are respectively equal to -0.21% for ESG funds to -0.13% for non-ESG instruments and those following Dietz

method are -0.22% and -0.11%.

Panels (C.1) and (C.2) confirm the persistence of negative gaps that, for ESG funds, tend to widen and that are respectively equal to -0.31% and to -0.37% per year.

Although results of the analysis are stable, we need to address some possible concerns about our findings. A first potential concern is that our results may be driven by funds with very negative gaps, since each fund receives an equal weight in the reported average regardless of its characteristics. In order to address this issue we verify the distribution of gaps across funds. Table (4) reports results of gaps ordered in percentiles and results show that, for both asset classes and for all intervals, performance gaps remain negative for more than the 50th percentile of the distribution, regardless of the methodology of computation. The second possible concern is that averages performance gap may be driven by the size of fund. In order to address this possibility, we compute performance gap for all the categories of funds (i.e. small, medium and large funds) and we find that results remain stable for all sizes and for the two categories of investment. Finally, in order to verify the sensitivity of our results with respect to the holding period chosen and to way in which data are presented, section (5) reports robustness checks on the investment horizon and on the methodology of computation.

Table 4: Investment strategies

	Mean	Std. dev.	Std. error	Sharpe ratio	Skewness	Kurtosis	% of months	25th perc.	50th perc.	75th perc.
Panel A: ESG funds										
Panel A.1: Pre-Crisis										
Time-weighted	2.52	3.53	(0.27)	0.67	0.36	1.62	-	0.50	2.86	3.75
Time-weighted (index)	3.23	4.23	(0.21)	0.72	0.38	1.54	-	-	-	-
Money-weighted	2.35	3.55	(0.62)	0.61	0.36	1.62	-	0.53	2.79	3.78
Money-weighted (Dietz)	2.36	3.57	(0.19)	0.61	0.38	1.65	-	0.53	2.74	3.73
Performance gap	-0.17	0.05	(0.16)	-7.15	0.76	3.27	100.00	-0.06	-0.01	0.05
Performance gap (Dietz)	-0.16	0.06	(0.15)	-5.15	1.39	4.00	96.00	-0.09	-0.01	0.06
Panel A.2: Crisis										
Time-weighted	-0.55	4.72	(0.31)	-0.13	-0.21	2.97	-	-2.35	-0.60	1.05
Time-weighted (index)	0.36	4.71	(0.20)	0.06	0.03	2.70	-	-	-	-
Money-weighted	-0.75	4.73	(0.98)	-0.17	-0.24	2.94	-	-2.42	-0.64	0.98
Money-weighted (Dietz)	-0.76	4.76	(0.25)	-0.17	-0.26	2.97	-	-2.40	-0.65	0.99
Performance gap	-0.21	0.08	(0.16)	-3.40	-0.49	2.99	100.00	-0.14	-0.02	0.07
Performance gap (Dietz)	-0.22	0.10	(0.15)	-2.67	-0.61	2.69	100.00	-0.18	-0.02	0.10
Panel A.3: Phasing-out										
Time-weighted	-7.19	6.56	(0.54)	-1.11	-0.09	1.40	-	-10.70	-7.56	-3.17
Time-weighted (index)	-9.31	8.34	0.24	-1.13	0.23	1.84	-	-	-	-
Money-weighted	-7.50	6.58	(0.51)	-1.16	-0.09	1.40	-	-10.87	-7.66	-3.30
Money-weighted (Dietz)	-7.56	6.64	(0.53)	-1.15	-0.11	1.42	-	-10.89	-7.70	-3.49
Performance gap	-0.31	0.05	(0.16)	-7.90	0.05	2.40	100.00	-0.31	-0.07	0.06
Performance gap (Dietz)	-0.37	0.12	(0.16)	-3.93	-1.24	3.25	100.00	-0.40	-0.08	0.06
Panel B: Non-ESG funds										
Panel B.1: Pre-Crisis										
Time-weighted	0.79	2.41	(0.21)	0.26	0.25	1.52	-	-1.35	0.55	3.41
Time-weighted (index)	3.38	3.97	(0.19)	0.81	0.39	1.68	-	-	-	-
Money-weighted	0.72	2.39	(0.53)	0.23	0.27	1.54	-	-1.39	0.53	3.39
Money-weighted (Dietz)	0.74	2.38	(0.20)	0.24	0.26	1.53	-	-1.39	0.53	3.36
Performance gap	-0.07	0.05	(0.06)	-4.44	-0.88	2.62	99.25	-0.06	-0.01	0.02
Performance gap (Dietz)	-0.05	0.05	(0.08)	-4.61	-0.48	2.00	90.00	-0.09	-0.01	0.03
Panel B.2: Crisis										
Time-weighted	-1.10	2.65	(0.25)	-0.44	-0.22	2.71	-	-3.18	-0.51	1.70
Time-weighted (index)	0.28	5.28	(0.21)	0.04	0.14	2.61	-	-	-	-
Money-weighted	-1.23	2.65	(0.78)	-0.49	-0.21	2.70	-	-3.29	-0.56	1.69
Money-weighted (Dietz)	-1.22	2.66	(0.25)	-0.48	-0.22	2.70	-	-3.31	-0.57	1.68
Performance gap	-0.13	0.02	(0.08)	-9.75	-2.08	7.12	100.00	-0.10	-0.00	0.04
Performance gap (Dietz)	-0.11	0.01	(0.08)	-12.13	-0.69	2.55	100.00	-0.13	-0.01	0.05
Panel B.3: Phasing-out										
Time-weighted	-3.90	3.44	(0.32)	-1.16	-0.16	1.39	-	-7.77	-2.23	0.77
Time-weighted (index)	-10.11	9.02	(0.23)	-1.13	0.19	1.84	-	-	-	-
Money-weighted	-3.96	3.49	(0.33)	-1.16	-0.16	1.39	-	-7.93	-2.35	0.77
Money-weighted (Dietz)	-3.94	3.47	(0.33)	-1.16	-0.17	1.40	-	-7.94	-2.36	0.74
Performance gap	-0.06	0.06	(0.05)	-2.77	-0.56	1.70	100.00	-0.11	-0.01	0.05
Performance gap (Dietz)	-0.04	0.04	(0.10)	-3.21	-0.93	2.25	94.59	-0.13	-0.00	0.08

This table reports results for investment strategies on euro area fixed income funds. For each fund, we calculate the time series of daily time-weighted and money-weighted returns computed with IRR formula and with the Dietz formula, with a holding period of 120 business days over the entire sample period. Daily time-weighted returns are also computed for Bloomberg Barclays MSCI Euro Corporate SRI Index and for Morningstar investment grade Eurozone corporate bond index. Performance gaps are computed for each fund as the difference between fund money-weighted and time-weighted returns. The reported statistics are computed from the time-series of the 1,435 daily cross-sectional averages for each item. Table reports unweighted average of daily gaps registered in the previous 5 business days. We report mean, standard deviation, standard error, Sharpe ratio, skewness, kurtosis of returns (in %). For the performance gap we report the fraction of days in which buy-and-hold overperforms market-timing (i.e., in which the performance gap is strictly negative). For each item we finally report percentiles of the distribution. All excess returns are computed with respect to the 30-day Euribor. Panel A reports statistics for ESG funds, panel B reports for non-ESG funds. Returns are annual in %. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

5 Robustness

In this section we verify whether results presented in section (4) are robust to different investment horizons (i.e. holding period). Therefore, table (5) reports performance gaps by holding period (i.e. 60, 120, 180 days). In order to address the possibility that results are driven by the methodology of calculation, performance gaps are computed as the unweighted average of daily gaps registered in the previous 5, 20, 60 business days.

Table 5: Performance gap - robustness

	holding period					
	ESG funds			Non-ESG funds		
	(60-day)	(120-day)	(180-day)	(60-day)	(120-day)	(180-day)
Panel A: Pre-Crisis						
past 5-day avg.	-0.24 (0.19)	-0.17 (0.16)	-0.10 (0.08)	-0.14 (0.07)	-0.07 (0.06)	-0.09 (0.03)
past 20-day avg.	-0.14 (0.10)	-0.11 (0.09)	-0.13 (0.10)	-0.08 (0.04)	-0.06 (0.04)	-0.06 (0.02)
past 60-day avg.	-0.04 (0.02)	-0.09 (0.07)	-0.16 (0.12)	-0.04 (0.03)	-0.06 (0.03)	-0.04 (0.02)
Panel B: Crisis						
past 5-day avg.	-0.28 (0.20)	-0.21 (0.16)	-0.19 (0.12)	-0.24 (0.07)	-0.13 (0.08)	-0.09 (0.04)
past 20-day avg.	-0.26 (0.19)	-0.17 (0.13)	-0.17 (0.11)	-0.21 (0.06)	-0.06 (0.03)	-0.09 (0.03)
past 60-day avg.	-0.09 (0.05)	-0.10 (0.08)	-0.15 (0.11)	-0.07 (0.03)	-0.06 (0.03)	-0.04 (0.02)
Panel C: Phasing-out						
past 5-day avg.	-0.37 (0.21)	-0.31 (0.16)	-0.32 (0.12)	-0.12 (0.04)	-0.06 (0.05)	-0.07 (0.04)
past 20-day avg.	-0.31 (0.19)	-0.21 (0.14)	-0.27 (0.11)	-0.18 (0.09)	-0.06 (0.02)	-0.09 (0.03)
past 60-day avg.	-0.11 (0.08)	-0.12 (0.09)	-0.20 (0.11)	-0.10 (0.03)	-0.06 (0.02)	-0.06 (0.02)

This table reports the mean of performance gap (i.e., the difference between a money-weighted and a time-weighted investment strategy) from the time-series of the cross-sectional averages, as a function of the investment horizon (in days). Table reports unweighted average of daily gaps registered in the previous 5, 20, 60 business days. Standard errors are in parentheses. Returns are yearly in %. Data are daily from Bloomberg for the sample Dec. 2017 - Jun. 2023.

Table (5) shows that either by shortening or widening the holding period and the interval of computation, the performance gap remains negative for both categories of investment and standard errors confirm its statistical significance for both categories of investment.

6 Conclusions

Working with a novel dataset at daily frequency, this paper studies performance-flows relationship of fixed income investors in euro area, taking into account the relative ESG risk exposure of each fund. We identify short-term determinants of individual fund flows, finding that flows significantly react to recent past performance. Sustainable flows significantly respond to government policy intervention to contain the spread of the virus and to monetary policy announcements. We measure investor timing ability with a statistic hereafter referred to as “performance gap”. Gaps remain negative and significant regardless of the asset class with sustainable funds exhibiting the worst gap respectively equal to -0.21% per year during the COVID-19 crisis and -0.31% per year in the phasing-out period from the pandemic. Our results remain robust under different investment horizons and methodologies of computation, providing solid investment prescription in favor of time-weighted strategies. Computing a simple time-weighted strategy carried out with sustainable funds, we find that buying and holding the index during the COVID-19 pandemic remains superior, even after controlling for risk. This provides support in contradicting a popular hypothesis that sustainable funds perform well during period of distress.

Appendix

This Appendix reports the list of fixed income funds by category of investment. The sample contains all open-end active funds denominated in euro (EUR) that invest in euro area fixed income. The dataset spans December 2017 through June 2023 and contains 1,504,191 daily observations across 767 unique funds, of which 165 meet ESG sustainability criteria. We exclude from the sample closed-end funds, exchange-trade products and funds-of-funds. Moreover, to ensure the accuracy of the analysis, we keep only funds that exist for at least 90 consecutive business days during the sample period. Tables (6) and (7) list fixed income funds in alphabetical order.

Table 7: List of funds (2/2)

ETOILE STRATEGIE TAUX-C	LBPAM OBLLI LONG TERME	RENTOBLIG
ETORPENSION RENTA MIXTA	LBPAM OBLLI MOYEN TERME C	RAM INDEXLP
EUFLUX FIX-I RET ST FIRST-D	LBPAM OBLLI REVENUS	ROBECO CUST LIA DRIV I-PEUR
EURIZON AM EURO BT	LBPAM OBLLI EURO GOVIES 3-5	ROBECO PHARMA OBLIGATIONS
EURIZON AM PROTEZIONE MER EU	LCL OBLLI MOYEN TERME EUR-PC	RSI OBLIGATIONS ETATS EURO 1
EURIZON FUND-BD EUR SHTRLT-R	LCL OBLIGATIONS 24 MOIS FC-C	RURAL 5 GARANTIA RENTA FIJA
EURIZON FUND-EUR LNGTHR LTR	LCL OBLIGATIONS EURO-D	RURAL EUROPA 2012 GARANTIA
EURIZON OBLLI EURO BREV TER	LEASETEN RENT FIJ CORTO FI	RURAL MIXTO 15
EURIZON OBLIGAZIONI EURO	LFP EURO SOUVERAINS	RURAL MIXTO 20
EURO OBLIGATION-A1 EUR	LFP MULTISTRATEGIES OBLIG-I	IVERTREE BOND-EURO-R CAP
EURO RAENTA-A1 EUR	LLB STAATSANLEIHEN EUR-A	S WALDVIERTEL BOND-A
EUROBONDGARANT I	LLOYD ADRIATICO CAP PRUDENTE	S3-A
EUROFUNDLUX FLOATING RATE-B	LLOYD ADRIATICO GARANTIT PIU	S5-T
EUROVALOR AHORRO EURO	LLOYD ADRIATICO PROTETTO PIU	S700
EUROVALOR BONOS CORPORATIVOS	LO FUNDS-EURO GOV FUNDMTL-PA	SABADELL GARANTIA EXTRA 20
EUROVALOR BONOS EURO L P	LUX IM-INCOME COUP II-DX-BL	SACEM
EUROVALOR EMPRESAS VOLUMEN	MACQUARIE BONDS EUROPE	SANTANDER MONETARIO PP
EUROVALOR GARANTIZADO ORO II	MADELEINE MID CAP FLX-EURCAP	SANTANDER SOST RF I-3-A
EUROVALOR GRNTZD ACC III FI	MAM FLEXIBLE BONDS-C	SCHNEIDER ENER SICAV SOLIDAI
EUROVALOR PATRIMONIO	MAM SHORT TERM BONDS-C	SCHRODER INTL-EURO GOV -A AC
EUROVALOR RENTA FIJA	MAM TAUX VARIABLE-C	SEB EURO BOND-A
EUROVLR AHORRO OBJETV 2018-A	MAM-TRANS DUR OBLG-C	SEB EURO SHORT RATE-A
F BANKINTER RENTA FIJA 6 GRT	MARCH PENSION RENTA FIJA FP	SEB TOTAL RETURN BOND FUND
FAIM ET DEVELOPPMNT SOLIDAR	MARCH RENTA FIJA CORTO PLAZ	SECURI-GAN-C
FEDERAL GLOBAL GREEN BONDS-P	MARCH RENTA FIJA CORTO PLAZA	SELGISON & CO EURO BOND-A
FIDEURAM RENDIMENTO	MICA GESTOBLIG	SELGISON EURO CORP BOND-A
FIDEURAM RISPARMIO	MEACA EUROERTRAG	SELG CORPORATE BONDS-C
FIH EURO CORP BD-EUR	MEDI MONETAIRE-C	SG OBLIG MOYEN TERME-D
FIM EURO	MEDI OBLIGATIONS VARIABLES	SG TRESORERIE 12 MOIS-E
FINCA ACTIVE DURATION	MEDIOLANUM ACTIVO FI SA	SG TRESORERIE 6 MOIS-E
FLEXPROTECTION SECURE 12	MEDIOLANUM RENTA-SA	SIGMA INV HSE FCP MED EUR ST
FLEXPROTECTION SECURE 13	MERCK FINCK-STIFTUNGSFOND-UI	SK CORPORATEBOND INVEST DEKA
FLEXPROTECTION SECURE 14	METAVALOR GLOBAL	SKENDBRG FD SICAV-EU BP-EURP
FLEXPROTECTION SECURE 15	METROPOLE F-M CORP BONDS-A	SLF (F) BOND 6M P CAP
FON FINECO BASSE FI	MFS MER EURO CREDIT-A1 EUR	SOPRANO PRNT TRMN OB-IEURA
FONDESEL SHORT TERM ASSET	MILLESIMA 2024-C ACC EUR	SOPRANO PRONTI TERMINE-B
FONDESPANIA DUERO HORIZO 2018	MIRABAUD FUNDS SHORT TERM	SOUVERAINS EUR 1-3-I C EUR
FONDITEL RNT FJ CORT PLAZ FI	MIXED CONSERVATIVE	SOUVERAINS EUR 3-5-I C EUR
FONDMAPFRE RENTA CORTO FI-R	MNVST-GOVERN BONDS-EUR	SOUVERAINS EUR 5-7-C EUR
FORCE LORRAINE DUO-CD	MONEGA - CORPORATE M SUST-I	SPEZIAL 43
FRANCE INVESTISS OBLIGATIO-C	MONTSEGUR SECURITE-C	SPPI MULTI-OBLIG-C
FRUCTI TRESORERIE-C	MOOREA FD- SUSTBL EUR FXD IN	SPPI SEREN-OBLIG-C
FT EUROGOVERNMENTS M	MS MONETARIO	SS EUR COR B ESG SCR I F-I
FT EUROZINS	MULTIPAR TRESORERIE PLUS-C	STRATEGIC OPPORTUNITY BD-D
FTIF-FIRKN EU GOV BD-AYDISEUR	MUTUAFONDO CORTO PLAZO-A	STRATEGIE CRDT EUR-R C EUR
FUNDY	MUTUAFONDO DINERO-A	STT-EURO CORE TREAS BOND-I
GAM EURO GOVERNMENT BD A	NAGELMACKER INSTTT-VARIAB TR	STT-EURO SUST CORP BD IF-ID
GCC MIXTO I PP	NATIXIS SECURITE JOUR	STT-SUS CLM EURO CRP BD FD-I
GENERALI EURO BD 1-3 YRS-BX	NB BRM-EURO BOND AB RE-EURIA	SUEDWESTBANK-INTERRENT-UNION
GENERALI IN-EU COR SHT BD-AX	NB GARANTIZADO EUROPA 70 FI	SWG-IBF EMU GOV NT EUR
GENERALI INV-CAE EUR BND-AY	NB ULTRA SHORT TERM EN CASH	TARENO-ENH IDX INVEST-BON RT
GENERALI INV-EUR CORP BD-AX	NEF-EURO CORP BND-C	TAUX REELS EUROPEENS-AC
GENERALI INV-EURO BOND-AX	NESTLE FRANCE OBLIG SOLID-E	THREADNEEDLE-EURO STR BD-AE
GESTIELLE BT CEDOLA-A	NN L GREEN BOND - I CAP EUR	TIKEHAU 2022-R ACC EUR
GESTIELLE MT EURO-A	NN L-EURO FIX INC-IC	TIKEHAU COURT TERME-AACEUR
GESTIFONSA MIXTO 25 FL-BASE	NORDEA 1 SCV EU IN LI B-YEUR	TIKEHAU SUBFIN FUND-A ACEUR
GESTION PRIVEE RENDEMENT-PD	NOVEPARGNE-C	TIKEHAU TAUX VARIABLE-A ACC
GETINO GESTION ACTIVA FI	OBLLI MOYEN TERME-D EUR	TRUSTEAM OBLIGATIONS CT - C
GI FOCUS EURO GOVERN BR TERM	OBLIG CORP 1-2.5 YEAR EUR-C	UBS (CH) IF-EUR BDS PA 1-X
GOYER & GO ZIRA AT LN-ANT-I	OBLIG DU CREDIT DU NORD	UCROBLIG NO 1 FCP
GROUPAMA CREDIT EURO-NC	OCTYS	UFF ALLOCATION PRUDENCE-C
GROUPAMA ETAT EURO CT-ID	ODDO BHF EUR SH-TRM BND FT	UNI-MT-C
GROUPAMA ETAT EURO ISR-ID	OFI OBLIGATIONS ISR - C	UNOFI-EXPANSION-C
GROUPAMA OBLIG LT	OMNIBOND	UNOFI-OBLIG
GROUPAMA OBLIG MONDE-N	OP-OBLIGAATIO TUOTTO-A	UNOFI-RENDEMENT 2-D
GSD PATRIMOINE	OPTIMIX EURORENTE FD G	VALIDA ANLEIHEFONDS 10
GVCGAESCO CONSTANTFONS	ORANO OBLIGATAIRE	Valida Anlehefonds 4
GVTE DIVERSIFIE I	OSTRICA EU INV GR CB OSTR	VALIDA ANLEIHEFONDS 12
HANNOVER CHEMISINVEST	OSTRIM SOVERAIN EUR-RCEUR	VALIDA ANLEIHEFONDS 6
HL-RENTEN EURO-FONDS	OSTRUM CASH PREMIERE-I	VALIDA ANLEIHEFONDS 8
HMT CORPORATES RISKCONT SH D	OSTRUM EURO INFLATION-I AEUR	VALOROBIGATIONS-D
HOTTING OBLIG CRT TRM EURO-A	OSTRUM OBLI CROSSOVER-I	VALPROGEEUR
HSCB EURO GVT BOND FUND-C	OSTRUM OBLI EUROS 3-5 ANS	VANGUARD EURO IN GR IX-EUR A
HSCB EURO SHORT TERM BND-C	OUDART OBLIGATION MOYEN TM-C	VANGUARD-20+ YR EUR TR IN-EA
HSCB EURO SHORT TERM GVT B-C	PACTEO TRESORERIE-EUR ACC	VANGUARD-EUR GV BND IDX- INV
HSCB SRI EURO BOND-AC	PANDA RENTA FIJA PP	VBY VK EURO SHHT TRM PLS ESG
HUGAU 12M	PBP AHORRO GP	VBY VK PIA HTM FONDS
HUGAU OBLI 3-5	PENSION INCOME D2	VEGA EURO SPREAD-RC
HYP0-RENT-A	PENSION INCOME D3	VEGA OBLIGATIONS EURO
IBERCAJA 2025 GARANTZDO 2 FI	PENSION INCOME D1	VENDOME OBLI MOYEN TERME-D
IBERCAJA CAPITAL GARANTIZ FI	PENSPLAN-ETHICAL LIF CONSERV	VINDOBONA METTERNICH-EUR
IBERCAJA MIXTO FLEXIBLE 15-A	PHIM SOLUT ALL WEATHER R3-R	WELZIA PATRIMONIO FI
IBERCAJA RENTA FIJA 2025-A	PL IBER DE PENS PROTECC 2012	WWW SELECT BONDS-C I
ILIM-INDEX EURGOV LONGBOND-A	PL IBERCAJA DE PEN SOLI 2012	
INDOCAM PF 3	PLACEURO DOM OPP-CAP EUR ACC	
ING DIRECT F NARANJA R F	PLAN DE PENSIONES FINECO 5	
INSIGHT-ILF EUR LIQUID PL -2	PLAN FINECOPENSION RENTA FIJ	
INTERMONEY RF CORTO PLAZO	POPSO EURO BOND-B	
ISHARES EU GV BD I(IE)-IEURA	POPSO TOTAL RETURN BOND-B	
IYA BD OPPPRINTS EUR-EUR B	PORT DETTES FINANCIER EUR-BC	
JPM EUR GOV SH DUR-A ACC E	PORTFOLIO LCR ALLOCATION-C D	
K 125	PORTFOLIO LCR CREDIT-C D	
K 5	PORTFOLIO LCR GOV	
K 66 FUND	POSTBANK EURORENT	
KC KATHREIN PFANDBRIEF +-RT	PROMEPAR ABSOLUTE RETURN-C	
KEPLER REALZINS PL RENTEN-A	PROMEPAR OBLI COURT TERME	
KEREN CORPORATE-R	PUBLITOP-TREASURY-I	
KUTXABANK RENTA FIJA PP	QUILVEST BONDS EURO S.TERM-C	
KUTXABANK RF CORTO FI	QUILVEST CASH EQUIVALENT-I	
KUTXABANK RF EMPRESAS FI	QUILVEST CREDIT SUB-I	
LA FRANCAISE OBJECT TP	R 263-FONDS	
LA FRANCAISE OBLIG CAR IMP-D	R+P RENDITE PLUS UI	
LA FRANCAISE SUB DEBT-C	R-2012 SPEZIAL-T	
LABORAL KUTXA RF GAR XIX FI	RAIFFEISEN-EU-SPEZIA-RENT-A	
LABORAL KUTXA RF GRITZ XX FI	RAINBOW FUND XV	
LACTALIS OBLIGATIONS-CLS	RAINBOW FUND XVI	
LAM-EURO-CORPORATES-UNIVERSA	R-CO 4CH NT ZERO CRD EURO-CT	
LAZARD EUR SHORT DURATION-IC	R-CO CONV CREDIT EURO-C EUR	
LAZARD LOW DELTA 12 MOIS	REGARD CREDIT EURO IG 1-3	
LAZARD VARIABLE FI	REGARD CREDIT EURO IG 5-7	
LBW UNTERNEHMENSAN EURO SEL	REGARD GREEN BONDS-H	
LBP ISR OBLI CREDIT	REGARD OBLIG PRIVIEES ISR-H	
LBPAM ISR OBLI CREDIT-E	REGARD OBLIGATIONS	
LBPAM OBLI COURT TERME-C	RENDITDEKA-CF	
LBPAM OBLI EUROPE C	RENTE 4 RENTA FIJA EURO	

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