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The exposure of French investment funds to transition climate risks

Investment funds are exposed to the risks associated with climate change, and especially to transition risks. There are two possible channels of transmission: a fall in the value of the financial assets in fund portfolios (notably "brown assets" which are those issued by companies carrying out activities that are bad for the climate); and investor outflows caused by changes in investor behaviour in response to climate challenges. French funds steadily sold off certain types of brown assets between 2011 and late 2022, and appear to be less exposed to climate risks than their European peers. However, climate risks remain significant and still pose a threat to numerous funds, as an average of 24% of portfolio assets were still brown at the end of 2022. This relatively high share of brown assets also affects the climate risk exposure of financial actors holding shares in these funds (e.g. insurers).

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JEL codes
G11, G23,
Q54

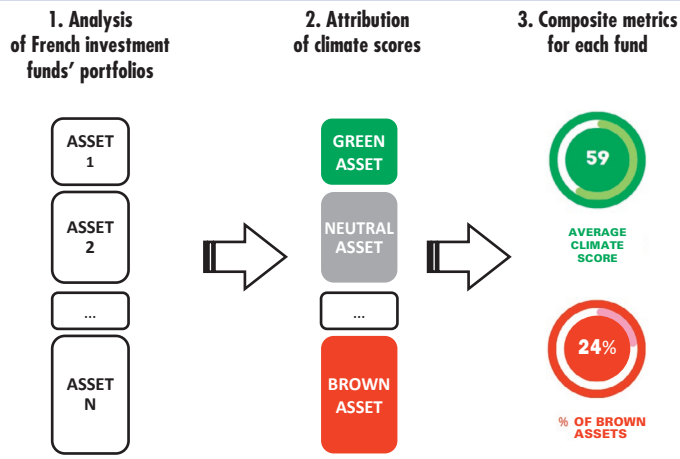
EUR 250 billion
value of brown assets held by French funds in the third quarter of 2022

274 out of 3,200
French funds were very exposed to climate risks (8.5% of the sample and 6.2% of the outstanding assets of the sample) in the third quarter of 2022

24%
average share of brown assets in French funds' portfolios in the third quarter of 2022

France: 2nd
least exposed European country to transition risks via its investment funds, after Germany, at end-2021

Method of evaluation of French investment funds' exposure to transition climate risks



Source: Banque de France.
Note: Some 3,200 French funds were analysed. The climate scores used are from ISS-ESG (see description in appendix).

1 Climate change poses a risk to financial stability

Climate change is a source of numerous financial risks and could therefore be a major threat to financial stability (Allen et al., 2021; Bolton et al., 2020). It notably increases the probability of a fall in the value of a large range of financial assets (i.e. market risk; Carney, 2015) due to a failure by investors to anticipate policy and regulatory changes and the rise in climatic hazards. Physical climate risks refer to the effects on economic actors (and, indirectly, on financial actors) caused by the physical consequences of climate change, such as extreme weather events. Transition climate risks are the potential effects of changes in: (i) consumer and investor preferences; (ii) technology; and (iii) public policies, for example changes in regulations or the introduction of a carbon tax (G20 Green Finance Study Group, 2017; NGFS, 2019). These costs can affect the productive capital of highly polluting firms, as well as their order books, their ability to obtain financing and their competitiveness.

The multifaceted nature of climate risks, the uncertainty over their magnitude and timing, and the difficulty in estimating their impact on economic agents can cause financial players and markets to misjudge the severity of the threat (IMF, 2020; NGFS, 2022). To protect themselves, financial institutions will seek to lower their exposure to securities issued by or loans granted to highly polluting firms ("brown assets"), and guide them with their transformation. They may also try to allocate more funding to assets that are better aligned with ecological transition targets ("green assets"), although this allocation shift is not strictly speaking part of a risk management approach. Accordingly, in July 2019,[1] French financial players agreed to gradually phase out the financing of thermal coal and, more generally, to develop strategies consistent with a target of net zero by 2050.

This article focuses on the exposure of French investment funds[2] to transition risks.[3] These risks can affect investment funds via two channels: a fall in the value of the financial assets in their portfolios that are linked to brown activities or issuers; and sudden outflows as investors alter their investment behaviour after reassessing the severity of the climate risks. Given investment funds' size and their key role in financial intermediation,[4] their exposure to climate risks could have systemic consequences for the financial system (see Box 1). In France, investment funds accounted for over 22%[5] of total assets under management at end-2022, while some 32% of the securities owned by French insurers were managed by funds (compared with 25% for households and 4% for banks). Investment funds also play an important role in scaling up transition financing, which, according to current estimates, needs to increase sixfold to meet international climate commitments (CPI, 2021).

Few studies have been conducted into the climate risk exposure of investment funds. The joint reports by the European Central Bank and the European Systemic Risk Board (ECB/ESRB, 2020, 2021) show that European investment funds are more exposed to transition risks than banks and insurers via their security holdings. However, Ceccarelli et al. (2023) indicate that European and US funds have tended to sell off holdings in highly polluting firms since 2018. Amzallag (2022) focuses on the strong interconnections between European funds with large brown asset exposures due to the similarities

1 See the Declaration of the Paris Financial Centre of 2 July 2019, "A new step for Green and Sustainable Finance".

2 Investment funds are collective schemes for investing in financial assets, enabling clients (corporations and individuals) to benefit from economies of scale and from the investment expertise of professional asset managers.

3 The decision to focus on transition climate risks is linked to the fact that they are expected to materialise much sooner than physical risks (Stroebel and Wurgler, 2021). According to this survey of academics and financial professionals, transition risks could materialise over the next five years whereas physical risks are expected to become a top risk for the financial system over the next 30 years.

4 The global asset management industry is playing a growing role in distributing liquidity and financing across economic sectors via the financial markets, and had total net assets of USD 41 trillion in the first quarter of 2022 (IMF, 2022).

5 This percentage is calculated based only on directly managed assets (SHS-S data).

between their portfolios, and finds that this can pose a systemic risk in the event of a major climate shock. In parallel, Cerqueti et al. (2021) show that ESG-certified funds (i.e. which comply with environmental, social and governance criteria) are less exposed to spillover effects from asset liquidations by other funds, due to the different nature of their portfolios and the reluctance of responsible investors to sell off ESG assets, even during a crisis. Lastly, the third joint report by the *Autorité de contrôle prudentiel et de résolution/Autorité des marchés financiers* (ACPR/AMF, 2022) provides an estimate of French funds' exposure to coal (between 1% and 2.3% of assets under management in 2021), as well as to oil and gas (around 3.4% in 2021).

This article assesses the exposure of French investment funds to transition climate risks by analysing their asset holdings. It shows how their exposure to these risks evolved between 2011 and 2022, and draws a comparison with other European countries. The study also identifies the types of financial institution that are most exposed to climate risks via investment funds.

BOX 1

Main channels of transmission of climate risks through investment funds

The physical and transition risks linked to climate change can affect economic agents by causing physical damage, disruptions to activity and, more broadly, changes to market conditions (technological disruption, changes in consumer preferences, new regulations and a deterioration in financing and insurance terms). As a result, firms exposed to climate risks – particularly those that pollute the most in the case of transition risks, and those that are least well located geographically when it comes to physical risks – could see a decline in their activity, leading to a fall in income and a rise in their probability of default (De Gaye and Lisack, 2022).

There are two channels via which climate risks can affect investment funds and, by extension, the stability of the financial system: market risk and the risk of investor outflows (see diagram below).

- **Market risk:** this first channel is common to numerous financial players. The pricing in of climate risks by financial markets, which could occur suddenly, will lead to a devaluation of brown assets (Pástor et al., 2021; Ardia et al., 2021). Such a shock would lead funds with high brown asset exposure to underperform, resulting in financial losses for investors.[1]

- **Risk of investor outflows:** some funds invest a large share of their portfolios in assets with low liquidity, while at the same time offering investors a high level of liquidity, meaning they can redeem their shares whenever they wish (liquidity mismatch risk). An intensification of climate risks and the related financial losses could prompt investors to adjust their behaviour (e.g. withdrawals of money from certain funds due to the climate risks). Massive investor withdrawals from funds exposed to brown sectors could trigger asset fire sales to meet these redemption requests, raising the risk of contagion to the entire financial system (Jondeau et al. 2021 on the risk of a run on brown assets).

1 Conversely, an overestimation of the scale and speed of the transition could lead to the emergence of a green asset bubble (Brav and Heaton, 2021; Jourde and Stalla-Bourdillon, 2021, 2023). This would most likely have negative repercussions for investment funds, but its analysis does not fall within the scope of this *Bulletin*.

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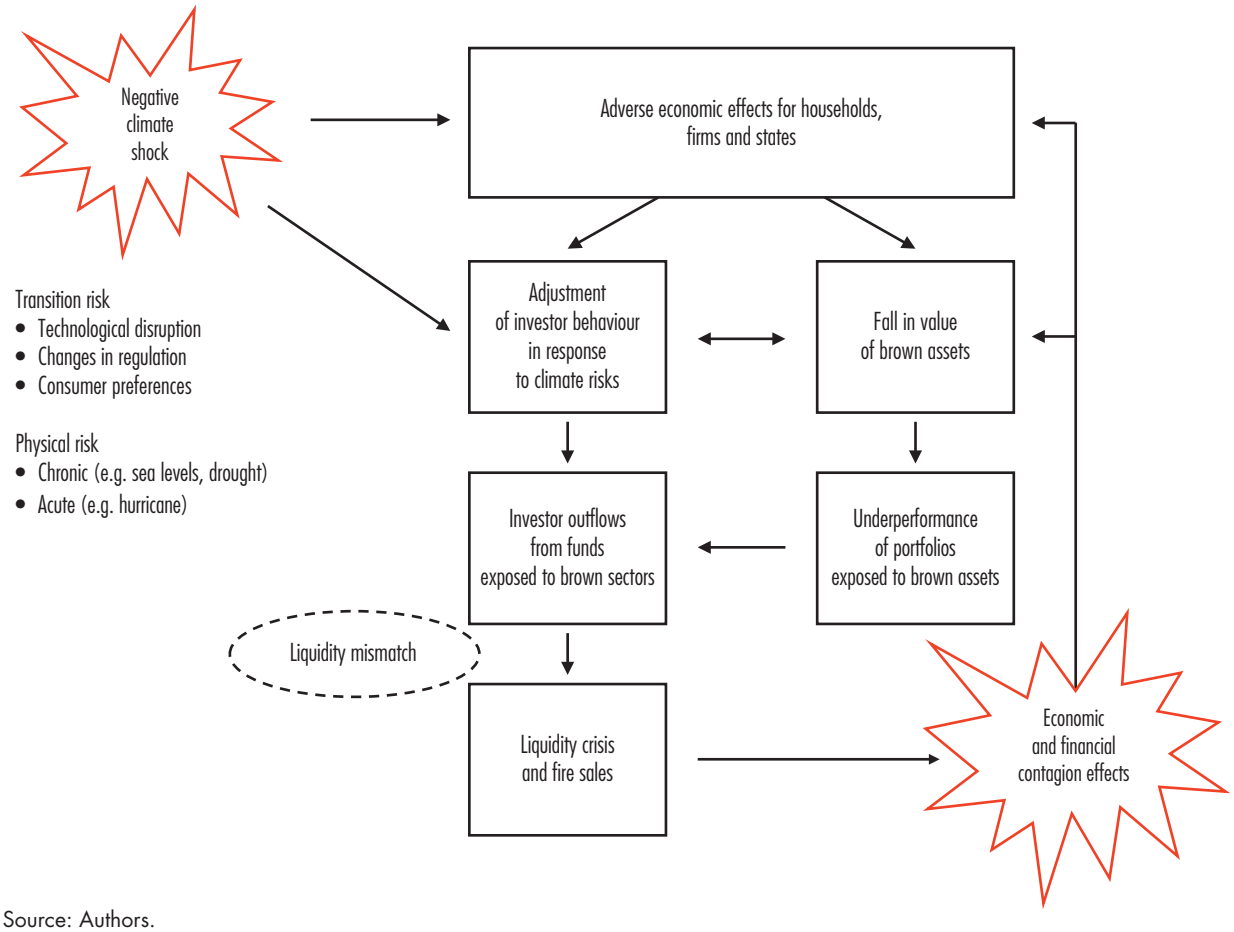
Channels of transmission of climate risk through investment funds



Source: Authors.

2 French investment funds' exposure to transition climate risks

A small share of French funds are highly exposed to climate risks

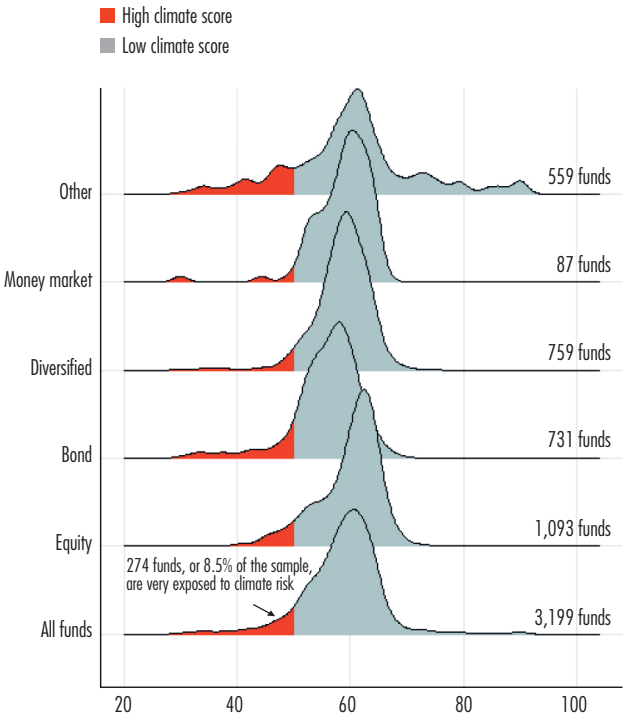
To identify those funds most exposed to transition risks, we calculate a score for each fund based on an assessment of the climate exposure of the financial assets in its portfolio (see methodological appendix; note that the climate risk measure used in this analysis is not an established standard). The climate score takes account of the sector to which the portfolio assets belong, the historical emissions of their issuer, and a forward-looking analysis based on greenhouse gas (GHG) emissions reduction policies. Funds with a score lower than 50 are considered to be highly exposed to transition risks as their portfolios contain a majority of assets (in value terms) that are insufficiently aligned with GHG emissions reduction targets. The value of these assets is expected to decline in the future, and could fall abruptly in the event of a disorderly transition or an increase in investor sensitivity to climate risks (Delis et al., 2018).

Of the 3,199 French funds analysed (representing a third of all French funds and nearly two-thirds of total assets under management),[6] 274 are found

6 These 3,199 French funds account for 32.5% of the French investment funds listed in the OPC Titres database in the third quarter of 2022 and 62.5% of their total assets under management. They were selected using the method described in the appendix which is designed to optimise the quality of the data. Although the method does not guarantee that the selected sample is completely representative, it appears sufficient for an initial assessment of the expected effects of climate risk on French investment funds.

C1 Breakdown of French investment funds by category and climate risk score

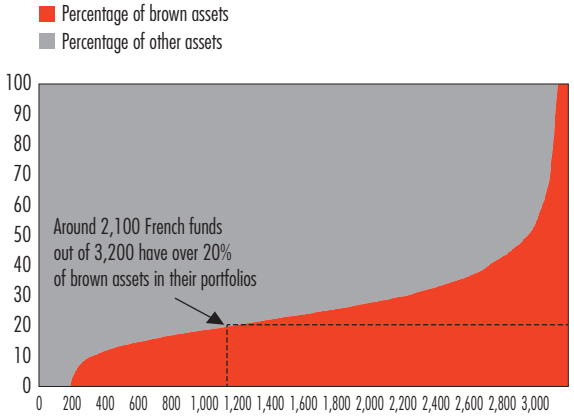
(x-axis: climate score)



Sources: Authors' calculations, OPC Titres, CSDB, ISS-ESG.
Scope: Sample of 3,199 French funds accounting for 62.5% of total assets under management in the OPC Titres database. The analysis excludes real estate funds.
Interpretation: A high climate score is associated with a better climate performance. Only a minority of funds appear to be high risk, i.e. with a climate score of 50 or lower (red-shaded area).
Note: Distribution of funds, based on a density function, according to their climate score and fund type.
Data for the third quarter of 2022.

C2 Share of brown assets in French investment funds' portfolios

(x-axis: number of portfolios; y-axis: % of brown assets)



Sources: Authors' calculations, OPC Titres, CSDB, ISS-ESG.
Note: Funds are ranked according to the percentage of brown assets in their portfolios, from the lowest to the highest.
Data for the third quarter of 2022.

to be highly exposed to transition risks in the third quarter of 2022, i.e. 8.5% of the studied sample and 6.2% of the sample's assets under management (see Chart 1). Conversely, a small number of funds (55, see Box 2 on the link between ESG reporting and funds' alignment with climate targets) have a high climate score of 75 or above. An analysis by fund type also shows that equity, bond and "other" funds[7] have higher risk exposure, while diversified funds (invested in several asset classes) and money market funds are less exposed on the whole to transition risk.

A large number of funds have non-negligible risk exposure

According to the previous analysis, only a minority of French funds are highly exposed to transition risks. However, this finding is based on the average score for all portfolio assets, which assumes that holding green assets will offset the devaluation of brown assets in the event of a climate shock (Pástor et al., 2021; Ardia et al. 2021). The credibility of this assumption is questionable, especially given current fears over the emergence of a "green bubble" (Borio et al., 2023; Jourde and Stalla-Bourdillon, 2021, 2023; *The Economist*, 2021).

If green assets cannot be relied upon as an effective hedge, then we need to look more closely at the percentage of brown assets (assets with an individual climate score of under 50, see methodological appendix for a discussion of the possible ways of identifying these assets and the methodology used in this study) in French funds' individual portfolios. Chart 2 shows that nearly 2,100 French funds out of the 3,199 analysed have more than 20% of brown assets in their portfolios. If these funds fail to adjust the size of their holdings, they could suffer significant losses in the event of a major repricing of these assets.

7 Funds not assigned to a specific category (Other) include employee savings funds, funds identified as alternative investment funds based on their reporting, formula funds and private equity funds. Real estate funds, which account for around 3.7% of French funds' total assets under management, were excluded from the analysis as they primarily invest in assets not covered by ISS-ESG climate data.

However, a limited number of large funds hold the majority of brown assets in the sample

The largest funds in terms of assets under management are particularly important as (i) they may generate more massive contagion effects in the event of an asset fire sale, and (ii) a major sell-off of brown assets by these funds will have a bigger impact on firms' financing costs.

Brown assets account for 24% of the asset holdings of the 3,199 French funds in our sample (or EUR 249 billion; see appendix). Chart 3 shows that these brown holdings are highly concentrated: a minority of funds (around 700 out of 3,199, or 22% of the sample) hold more than 80% of the total brown assets in the sample. This is similar to the finding for European banks in the ECB/ESRB joint reports (2020, 2021). Numerous funds are exposed to transition risk, and this exposure is highly concentrated among a small minority of funds.

This distribution is as uneven as the general distribution of assets under management. The largest funds in terms of assets under management hold the largest amounts of brown assets, giving them a triple responsibility: the alignment of large funds is essential to limit the risk of contagion, to send a price signal (i.e. increase in the cost of capital) to high-emitting firms, and to foster the ecological transition.

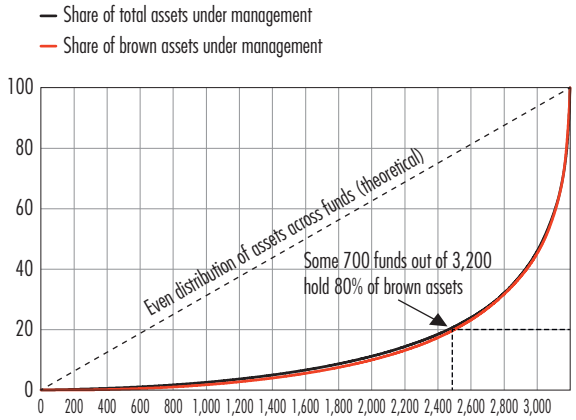
3 A historical and geographical perspective

A gradual withdrawal from brown sectors since 2011

To what extent have French investment funds adjusted their asset allocation over recent years to align themselves with climate targets? The climate score used previously shows the situation at end-2022 and cannot be calculated prior to this date due to a lack of climate data. This problem can be resolved by examining the percentage of asset holdings belonging to brown sectors (oil, coal, metals and mining, air transport[8])[9] in the funds' portfolios (see appendix).

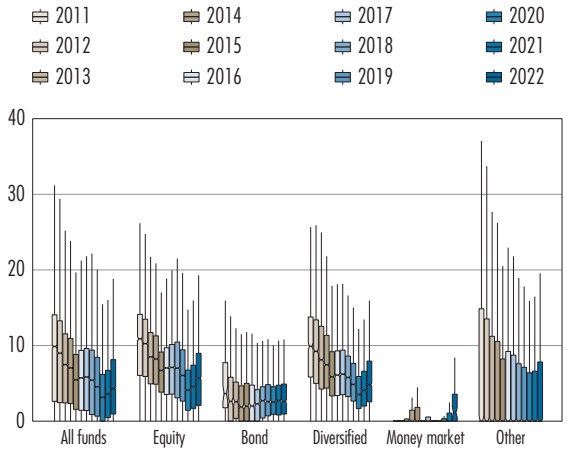
Equity, diversified and other funds all reduced their holdings of brown sectors between 2011 and 2022, with the median percentage holding falling from 10% to 4.5%

C3 Concentration of brown assets in French investment funds' portfolios
(x-axis: number of portfolios; y-axis: % share of cumulative brown asset holdings)



Sources: Authors' calculations, OPC Titres, CSDB, ISS-ESG.
Note: Funds are ranked according to the amount of brown assets in their portfolios, from lowest to highest.
Distribution of total brown assets across French funds' portfolios.
Data for the third quarter of 2022.

C4 Share of brown sectors in French investment funds' portfolios
(%)



Sources: Authors' calculations, OPC Titres, CSDB.
Note: Change in the percentage of assets related to the brown sectors in French funds' portfolios. For each date, we show the median (horizontal line, in bold), the first and third quartiles (lower and upper borders of the rectangle), and the lowest and highest values (in an interval of 1.5 times the interquartile below/above the first/third quartile, bottom and top ends of the line associated with each date).
Data from 2011 to end-2022.

8 The sector classification used (Global Industry Classification Standard) does not have a separate category for lithium producers. There is also some debate as to whether they should be included among brown sectors. However, lithium only accounts for a small portion of the mining industry, both in terms of volumes and revenues. Consequently, its inclusion is not likely to skew the results.

9 These sectors are among the worst rated according to the ISS climate score used in the rest of the study (see Chart A2).

BOX 2

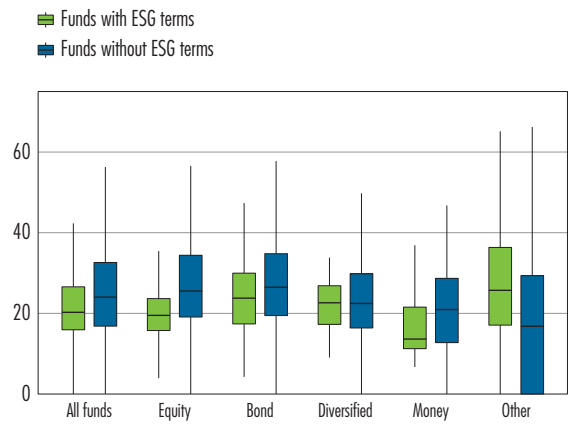
ESG (environmental, social and governance criteria) reporting by investment funds: a useful indicator of transition climate risks

Does the presence of an environmental term (in the broadest sense, e.g. climate, environment, green, SRI, ESG)[1] in the name of a fund really indicate that it is trying to reduce its exposure to climate risks or is it more of a marketing tool? Several studies show that ESG-certified funds attract more inflows than their non-ESG counterparts (for example, Hartzmark and Sussman, 2019), which could encourage greenwashing.

The chart opposite shows that French investment funds that adopt ESG terms in their title hold fewer brown assets than their non-ESG counterparts. The result is statistically significant, and is notably valid for equity, bond and money market funds. The findings are consistent with those of Bui Quang and Nefzi (2023) who examine French ESG-certified equity funds using a different climate risk metric. A study by Darpeix and Demartini (2023) also finds that French funds that declare they have a sustainable investment target (Article 9 of the SFDR)[2] hold more green bonds and are less exposed to fossil fuels.

Despite this positive result, funds using ESG terms still hold a high proportion of brown assets, which supports the case for developing strict certification, focused on institutions' transition plans, to allow investors to make more informed choices. The introduction of climate reporting obligations for investment funds (see SFDR) could also encourage them to reduce their exposure to climate risks (Mésonnier and Nguyen, 2021).

Brown asset holdings of funds using ESG terms
(% of brown assets in fund portfolios)



Sources: Authors' calculations, OPC Titres, CSDB, ISS-ESG.
Note: Percentage of brown assets in the portfolios of French funds with and without ESG (environment, social and governance) terminology in their title. For each type of fund, we show the median (horizontal line, in bold), the first and third quartiles (lower and upper borders of the rectangle), and the lowest and highest values (in an interval of 1.5 times the interquartile below/above the first/third quartile, bottom and top ends of the line associated with each fund type). Data for the third quarter of 2022.

1 This identification based on keywords is similar to the approach used by Brière and Ramelli (2021). The word search was carried out in French and English.
2 Sustainable Finance Disclosure Regulation.

over the period (see Chart 4). The trend is particularly noteworthy given that equity, diversified and other funds have the largest exposures to brown sectors. For all fund categories combined (except money market funds), the share of brown assets held by the most exposed funds has also diminished over time. By contrast, the share of assets belonging to brown sectors held by money market funds has increased, although it remains limited at under 2% of their portfolios.

The analysis therefore suggests that investment funds have lowered their exposure to the selected brown sectors, either via a flow effect, by excluding the most polluting industries (sell-off of positions), or via a valuation effect (relative fall in the market price of brown sectors). The valuation effect appears to have played an important role as the market capitalisation of brown sectors in European equity markets has halved over the period.[10] These results are an encouraging sign

10 Share estimated using Refinitiv Datastream indices. The list of brown sectors used is similar to that we use to identify funds' holdings of brown sectors.

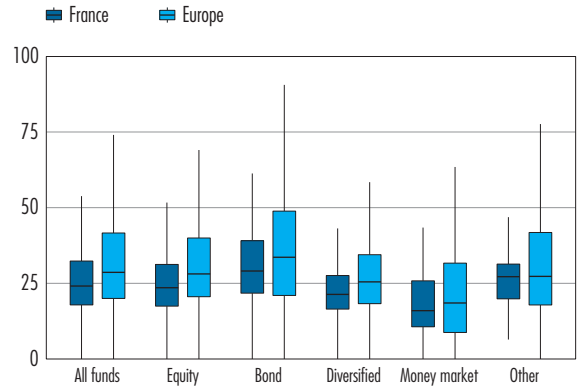
of French financial players' ability to meet their goal of rapidly ending thermal coal financing and helping the European economy achieve net zero by 2050.

French funds are generally less exposed to climate risks than their European peers

In this section, we compare French investment funds' exposure to brown assets to that of their European peers in December 2021[11] (see equation 2 in the appendix and Chart 5). Our analysis shows that French funds hold fewer brown assets than funds based in other European countries.[12] France has the second-lowest exposure after Germany. The difference in brown asset holdings between France and other European countries can be seen across all fund types.

This difference in transition risk exposure can be explained by the fact that funds tend to hold more national assets in their portfolios. On average, French corporate and sovereign bonds have a higher climate score than those of their European partners (see Charts A3 and A4 in the appendix). As a result, French investment funds are less exposed to transition risks than their European peers, and the latter need to make greater efforts to align their portfolios with climate targets.

C5 Comparison between France and Europe by investment fund type
(% of brown assets in fund portfolios)



Sources: Authors' calculations, Lipper Refinitiv, CSDB, ISS-ESG.
Note: Comparison, for each fund type, of the brown asset holdings of French and European (European Union and United Kingdom, excluding France). For each type of fund, we show the median (horizontal line, in bold), the first and third quartiles (lower and upper borders of the rectangle), and the lowest and highest values (in an interval of 1.5 times the interquartile below/above the first/third quartile, bottom and top ends of the line associated with each fund type). Data for December 2021.

4 The entire financial system is exposed to transition climate risks via investment funds

Investment funds act as intermediaries for economic agents wishing to invest in financial markets. The losses these funds incur will therefore have knock-on effects on other investors, exposing the rest of the financial system to the risk of contagion. Which French investor categories are most exposed to brown assets via their direct holdings and via their asset managers?

In France, the categories that directly hold the largest amounts of brown securities are funds, insurers and banks (respectively EUR 261 billion, EUR 238 billion and EUR 229 billion), as illustrated in Chart 6. Brown assets account for 24% of funds' entire portfolio security holdings (excluding fund shares), compared with 18% for insurers and 22% for banks. Even when assets are broken down by category (equities and bonds) or by issuer type (non-financial corporations, financial corporations, public sector entities), investment funds still have a higher proportion of brown assets than other investor categories. These findings suggest that investment funds' holdings do not merely reflect the assets that are available: funds are particularly exposed to brown assets and, as a result, to transition climate risks.

The different investor categories also hold brown assets indirectly via their ownership of investment fund shares.[13] Insurers' holdings of brown assets increase by EUR 163 billion once their investment fund shares are taken into account, compared with just EUR 10 billion for banks (see Chart 6). The percentage of brown assets held by insurers thus rises from 18%[14] to 20% of total

11 The sample of European funds selected, after applying the filters described in the appendix to optimise data quality, accounts for around half of European funds' total assets under management.

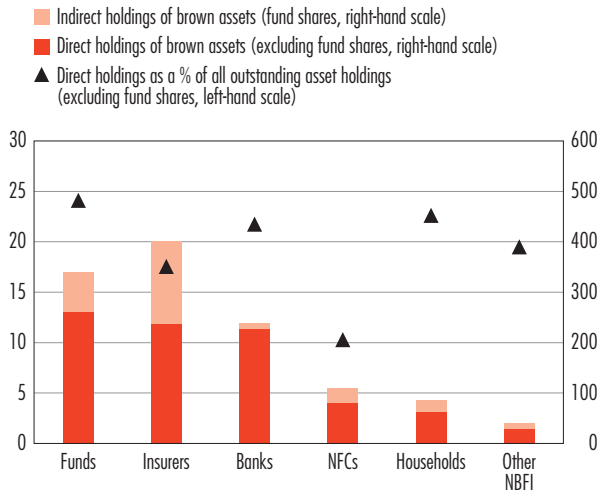
12 This difference is statistically significant.

13 To analyse indirect holdings, we need to "unpack" all assets held via investment fund shares. To do this, we replace the fund shares in each investor category's portfolios with the assets held via these funds.

14 Fund shares are excluded from total assets for the calculation of this percentage.

C6 Exposure of different French investor categories to brown assets, notably via investment funds

(left-hand scale: %; right-hand scale: EUR billions)



Sources: Authors' calculations, SHS-S, Lipper Refinitiv, OPC Titres, CSDB, ISS-ESG.
Note: Only securities are taken into account. Bank loans are therefore excluded from the analysis. The figures shown are estimates and may differ depending on the definition of brown assets used. NBFI, non-bank financial intermediaries; NFCs, non-financial corporations. Data for the fourth quarter of 2022.

assets.[15] This is particularly important as insurers in turn act as intermediaries for households via life insurance products (not shown in Chart 6). The share of brown assets held by investment funds therefore impacts the transition risk exposure of the other investor categories.

⁂

On the whole, to ensure sound management of climate risks, investor categories need to take better account of their exposure to transition risk, both in terms of direct holdings and indirect exposures via their ownership of investment fund shares. As well as reducing direct management of brown assets, there is also a need to increase inflows into funds that are better aligned with climate targets, and to encourage other funds to manage their brown asset exposures more carefully.

15 Fund shares are included in total assets for the calculation of this percentage.

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Appendix

1 Methodology

Data on security holdings

The study uses a regulatory database compiled by the Banque de France showing the allocation of French investment funds' portfolios to individual securities (OPC Titres). In addition to this database, the study uses climate data (on issuers) provided by ISS-ESG,[1] a commercial database, and information on the securities issued by each entity from the Eurosystem's Centralised Securities Database (CSDB). We also use the SHS-S regulatory database, which provides information on the securities held by certain categories of investor in the euro area, to determine the sectoral composition of holders (subscribers) of French fund shares. The European comparisons are carried out using the Lipper Refinitiv commercial database, which covers the portfolio holdings of certain European funds. However, Lipper Refinitiv contains fewer French funds than OPC Titres, which may explain some divergences.

Identification of brown assets

There are different approaches for identifying brown assets:

- Sectoral classification: this is the approach used in the joint ACPR/AMF report which focuses on holdings of fossil fuel firms (coal, oil and gas). On this basis, French insurers are found to have an exposure of around 2%. The ACPR also uses this approach in its climate stress test (Clerc et al., 2021), but includes a larger number of sectors, with the result that French insurers are found to have an exposure of close to 17%.
- The level of greenhouse gas (GHG) emissions (in absolute terms or relative to the firm's turnover), to identify firms in the sample that are high emitters, regardless of sector. However, the threshold used for this approach is necessarily arbitrary and there are challenges relating to the definition of GHG emissions (scope 1, scope 2, or scope 3) and the quality of the data. This type of approach is based on historical data and does not take account of emissions reduction targets. It is the approach generally used in ECB/ESRB reports.
- A climate score compiled using a combination of indicators and that takes account of the firm's sector of activity, its historical emissions and a forward-looking analysis based on its GHG emissions reduction policy. The figures in this study are based on this approach.

More specifically, the climate score used in this study comes from the ISS-ESG commercial database.[2] For sovereign bonds, the climate score evaluates the government's effectiveness in implementing GHG emissions reduction policies in its country, and in adapting to climate change by reducing its vulnerability to climate risks.

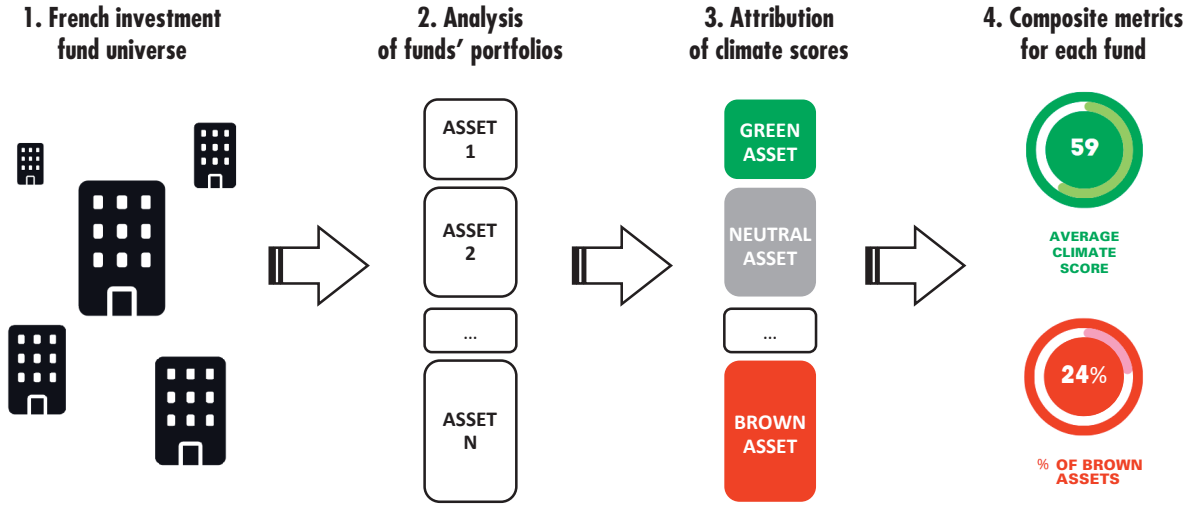
The score is a figure between 0 and 100, where 100 designates assets that are most aligned with climate targets. Assets with a score of under 50, the threshold set by ISS-ESG to distinguish between assets that have high and low exposure to transition risks, are defined as brown assets. For example, firms in the oil, gas and coal sectors are considered to be brown assets on average, whereas renewable energy firms have very high climate scores (see Chart A2).

1 ISS-ESG is the responsible investment arm of Institutional Shareholder Services Inc. (ISS).
2 The variable used is called the Carbon Risk Rating.

Study sample and transition risk metrics

The sample comprises 3,199 French funds, or 32.5% of all French investment funds in the OPC Titres database and 62.5% of assets under management. Only funds where 50% of assets under management have a climate score are kept in the sample. We also concentrate on funds with over EUR 10 million of assets under management.[3] The approach used to identify the climate risk metrics is described in Chart A1.

CA1 Method for evaluating the exposure of French investment funds to transition climate risks



Source: Authors.
Note: Some 3,200 funds are analysed. Their portfolio holdings are obtained from the Banque de France regulatory database, OPC Titres. The climate scores used are from ISS-ESG. The two risk metrics shown in the diagram correspond to equations (1) and (2).

For each fund, we calculate three metrics: (i) a weighted average of the climate scores of the assets held (equation 1); (ii) the percentage of brown assets held (climate score of less than 50, equation 2); and (iii) the percentage of assets issued by firms in brown sectors (i.e. oil, coal, metals and mining, air transport; equation 3).

$$S_{Fund_j} = \sum w_{i,j} S_{Asset_i} \quad (1)$$

where S_{Asset_i} and S_{Fund_j} are the climate scores of asset i and fund j and $w_{i,j}$ is the percentage weight of asset i in fund j. This measure is used to create Chart 1.

$$PAB_{Fund_j} = \sum w_{i,j} AB_i \quad (2)$$

where PAB_{Fund_j} is the percentage share of brown assets in fund j, $w_{i,j}$ is the percentage weight of asset i in fund j and AB_i is a binary variable that takes the value 1 if asset i is brown. This measure is used to create Charts 2, 3, 5 and 6, and the chart in Box 2.

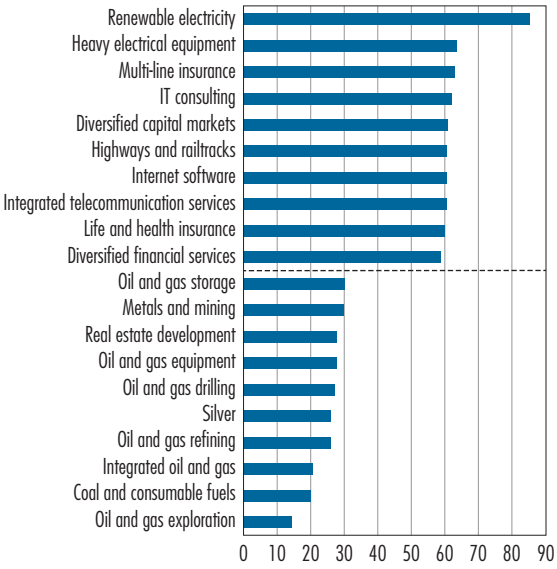
$$PSB_{Fund_j} = \sum w_{i,j} SB_i \quad (3)$$

where PSB_{Fund_j} is the share of brown sectors in fund j (i.e. the percentage of the portfolio assets that belong to a brown sector), $w_{i,j}$ is the percentage weight of sector i in fund j and SB_i is a binary variable that takes the value 1 if asset i belongs to a brown sector. This last measure is used in Chart 4.

3 Derivative products are excluded from the analysis as they are valued as unrealised gains or losses in the OPC Titres database.

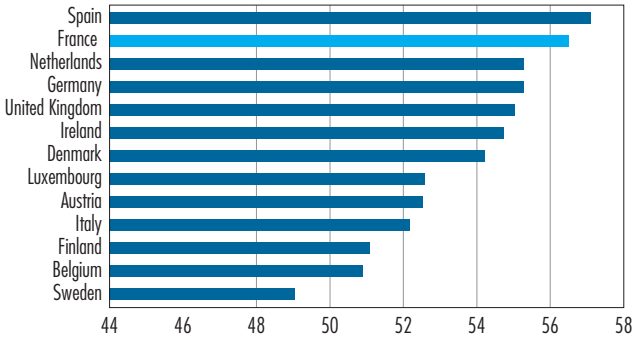
2 Climate score of assets

CA2 Average climate score of assets by sector



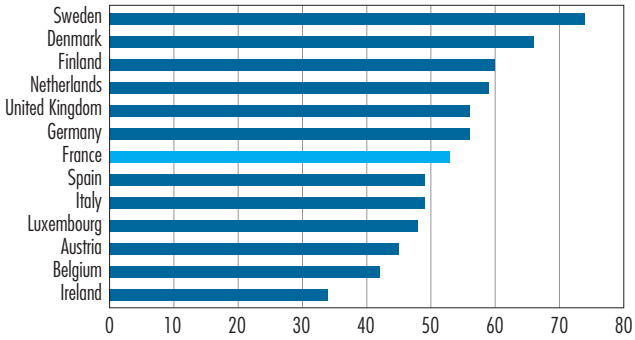
Sources: Authors' calculations, ISS-ESG.
Interpretation: A high score is associated with a better climate performance.
Note: The average asset climate score is calculated for each sector (GICS typology). Only the ten sectors at the extremes of the distribution are shown.
Data for the third quarter of 2022.

CA3 Average climate score of assets, by country (excluding sovereign bonds)



Sources: Authors' calculations, ISS-ESG.
Interpretation: A high score is associated with a better climate performance.
Note: Data for the third quarter of 2022.

CA4 Climate score of sovereign bonds



Source: ISS-ESG.
Interpretation: A high score is associated with a better climate performance.

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