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Strategic Asset Allocation for a Default Pension Plan

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Marie BRIÈRE, *Head of Investor Research Center at Amundi*

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Marie BRIÈRE
Head of Investor Research
Center at Amundi
marie.briere@amundi.com

Abstract

This literature review discusses how to design a default life-cycle asset allocation for a defined contribution (DC) pension scheme. This default option may be the same for all participants, or it could be customised to plan members' profiles. In particular, customising the allocation towards the individual's labour income profile, real estate exposure and social security benefits is key. Environmental, social and governance (ESG) considerations are becoming essential to pension plan members, who are demonstrating an increasing appetite for socially responsible (SR) investment. In terms of pension funds' fiduciary duty, a key issue is to assess the performance of SR investment compared to conventional investment. Changing investors' preferences towards SR investment can also change the equilibrium expected returns of SR vs conventional investment. Finally, through active ownership, pension funds members can play a key role and impact firms and society at large.

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About the author

Marie BRIÈRE

Marie Brière is head of the Investor Research Center at Amundi. She is also an affiliate professor at Paris Dauphine University and an associate researcher at the Centre Emile Bernheim at Solvay Brussels School of Economics & Management. Dr. Brière began her career as a quantitative researcher at the proprietary trading desk at BNP Paribas. She also served as a fixed-income strategist at Crédit Lyonnais Asset Management and as head of fixed income, foreign exchange, and volatility strategy at Crédit Agricole Asset Management. Her scientific articles have been published in international academic journals including the Financial Analyst Journal, Journal of Banking and Finance, Journal of International Money and Finance, World Development, etc. She received the Markowitz award for her article with Zvi Bodie on "Sovereign Wealth and Risk Management", published in the Journal of Investment Management. She holds a PhD in economics from the University Paris X and graduated from ENSAE.

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Introduction

In most countries, a large number of DC plan participants, particularly those with lower levels of financial education, wealth and income, show a large degree of inertia in their contribution and investment decisions (Beshears et al., 2006; Seelajaroen and Busaratrakul, 2020). They tend to opt for the default contribution rate and the default asset allocation. Plan members who actively move away from the plan default investment option tend to adopt naïve diversification strategies, such as equally weighting all funds in the plan. They also typically fail to rebalance regularly. In response to this concern, plan sponsors have begun adopting as the default option "life-cycle" funds, which automates for investors the tasks of allocating their assets appropriately and rebalancing their portfolios.

In this literature review, we will discuss what could be a well-designed default life-cycle asset allocation for an individual pension scheme. This default option may be the same for all participants, or it could be customised to plan members' profile (Dahlquist, Setty, and Vestman, 2018). In this case, it could depend on observable individuals' characteristics. The three largest assets for individuals outside of their pension plan are typically their human capital, their residential property and their first pillar (social security) pension. Individuals' financial decisions over the life-cycle should thus to be affected by the characteristics of these assets. The early literature on dynamic consumption and portfolio decisions ignored these non-financial assets, but more recently, a large literature has investigated how non-financial positions can affect portfolio choices. In particular, we will see that customising individuals' proposed allocations towards their labour income profile, real estate exposure and social security benefits would be key.

Environmental Social and Governance (ESG) considerations are becoming essential. Pension plan members are demonstrating an increasing appetite for socially responsible (SR) investment (Bauer, Ruof and Smeets, 2020; Brière and Ramelli, 2021a). In terms of pension funds' fiduciary duty, a key issue is to assess the performance of SR investment compared to conventional investment. This task is not easy, as changing investors' preferences towards SR investment will also change equilibrium expected returns of SR vs. conventional assets going forward. Finally, active investors can have a key role and impact firms and society at large.

1 - Definition of strategic asset allocation for a default pension plan

In this section, we will discuss the rationale of life-cycle asset allocation, which is used as default option in many DC pension plans around the world, and we will discuss possibilities to personalise default asset allocations depending on individual characteristics.

1.1 - Life-cycle asset allocation theory

Life cycle models (Merton, 1969, 1971; Samuelson, 1969) usually consider three different levels of decision: portfolio choice, savings rate and labour supply. In what follows, we will consider labour supply (for example the retirement date) and savings as exogenously defined, and we will focus on portfolio choice decisions.

From a theoretical point of view, the problem of the optimal investment choice for an individual can be written as a combination of wealth and consumption goals, constrained by risk budgets (e.g., maximum loss). For example, the individual's objective will be to generate the highest probability of meeting the objectives, and the lowest possible loss in the event that adverse market conditions make it impossible to achieve these objectives. Under these conditions, it is particularly important to take into account the investor's personal objectives and risks (Merton, 1969, 1971). In addition to market risks, those related to his salary or his exposure to the real estate market can substantially alter dynamic asset allocation decisions. The optimal investment strategy depends on how the performance of the portfolio interacts dynamically with risk factors.

The standard Merton investment problem can be written, in its simplest form, as a simple goal of maximising wealth over the T horizon. Under the usual assumptions:

- the market offers constant investment opportunities (constant risk-free rate, expected return on constant risky investment),
- individuals have a CRRA (constant relative risk aversion) utility function and maximise the utility expectation linked to their future wealth,
- they have no human capital, the optimal weight in risky assets is constant over time and does not depend on the horizon or the level of initial wealth, but only on the constant expected return μ and constant volatility σ, and the individual risk aversion γ (r beeing the risk-free rate):

$$w = \frac{\lambda}{\gamma\sigma} = \frac{1}{\gamma}\frac{\mu - r}{\sigma^2}$$

For example, for "usual" risk aversion levels (i.e., between 2 and 10), the optimal allocation of risky assets varies between 50% and 10%.

Mean reversion in stock returns

In a world where risk and expected returns are constant over time, the risk per investment period (measured as the annualised variance of holding period returns) is constant across all investment horizons. But empirical evidence shows that equities, for example, display less volatility in the long run than in the short run. Campbell and Viceira (2005) show that this empirical pattern implies that buy-and-hold long-term investors should hold more equities in their portfolios than buy-and-hold short-term investors.

Moreover, times of high stock prices relative to dividends (or earnings) have a tendency to be followed by periods of low average stock returns, and conversely, a pattern that is called usually “stock returns mean reversion”. Campbell and Viceira (1999, 2002) examined the question of optimal dynamic long-term portfolio choice under time-varying expected stock returns. They show that long-horizon investors should gradually modify their allocation to stocks in response to changes in expected returns. It is also optimal for long-term investors to overweight equities in their portfolios relative to short-horizon investors. This strategic tilt reflects a positive intertemporal hedging demand for stocks. If stocks mean-revert, realised stock returns are high at times of low expected future stock returns. Stocks provide a good hedge against a deterioration in their own expected future return, and are relatively safer assets for long-term investors.

Human capital and asset allocation

In practice, individuals receive a salary derived from their work. Total wealth should be interpreted as the sum of financial wealth and human capital (i.e., the discounted value of all income streams related to wages). Over the course of life, human capital tends to decrease while financial wealth increases. Bodie, Merton and Samuelson (1991) have shown that human capital considerations should lead investors to change the target asset allocation for their financial portfolios over time. This is because as investors age, their human capital gets depleted as it is transformed into consumption and savings.

If investors’ human capital is certain, then it is equivalent to an implicit capital invested in bonds. When the investor is young, he can expect to earn many years of labour income, but he/she typically has little wealth saved. As a consequence, human capital represents a large share of his/her total wealth. The young investor should then tilt his financial portfolio towards risky assets to offset the large bond position already held through human capital. As the investor ages, the value of the human wealth declines, as he/she has less years left to earn labour income and his/her financial wealth grows. The bond investment represented by his human wealth becomes lower relative to total wealth, and the investor will have to reduce the risky assets position in the financial portfolio. This gradual de-risking of the investment portfolio with age is the standard solution we have implemented in life-cycle funds.

If labour income is risk-free, human capital can be proxied by a bond. Having a large implicit position of risk-free assets, it is optimal for the individual to tilt its financial portfolio towards risky assets. But if labour income is positively correlated with equities (or with risky assets more generally), then the portfolio should be tilted towards safe financial assets, even if equities display a positive risk premium. We will come back to this question in Section 2.

1.2 - International diversification and optimal currency hedging

What role should foreign currency play in an investment portfolio? Currencies per se are traditionally seen as an investment with high volatility and low average return. But at the same time, many investors diversify their portfolios internationally, and when they do not hedge the resulting currency exposures, they hold indirect positions in foreign currency. The academic literature has advanced a number of reasons why investors might want to hold foreign currency. A first reason lies in hedging demand, resulting from the covariances between foreign currencies and the state variables that determine investors' marginal utility. For example, one type of hedging demand may arise if the investor wants to protect against inflation and there is no domestic asset that is risk-free in real terms (in many countries, only nominal bonds are available). In this case, the minimum variance portfolio may contain foreign currency that appreciates when there is an inflation shock (Adler and Dumas 1983). This effect can lead to substantial utility gains for investors in developing countries that experience high inflation shocks related to their own currency devaluation (Brière and Signori, 2013).

Campbell, Serfaty-De Medeiros and Viceira (2010) show that equity investors who aim at minimising the risk of their portfolio should short currencies that are more positively correlated with equity returns (for example the Australian and Canadian dollar) and should hold long positions in the currencies that are more negatively correlated with those returns (typically the euro and the Swiss franc). The situation is quite different for bond investors, because most currency returns are almost uncorrelated with bond returns. Bond investors willing to minimise the risk of their portfolio should thus avoid holding currencies, by currency-hedging their international bond positions fully.[1] This result is consistent with the common practice of institutional investors.

Another reason to hold foreign currencies is related to investor's speculative demand. Even if unconditional average currency returns are close to zero, there is evidence that these returns fluctuate over time. For example, currencies with high short-term interest rates deliver higher returns on average than lower-yielding currencies (see the literature on the forward premium puzzle, e.g., Fama 1984; Boudoukh Richardson and Whitelaw, 2016). This can lead to profitable active currency strategies. The carry trade strategy, for example, consists in holding high-rate currencies and shorting low-rate currencies. This strategy was extremely profitable until 2008 (Brunnermeier, Nagel, and Pedersen 2008; Lee and Wang, 2019).

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[1] *The US dollar is an exception to this general pattern. It tends to appreciate when interest rates rise, i.e., bond prices fall around the world. This generates a modest demand for US dollars by risk-minimizing bond investors.*

1.3 - Impact of portfolio constraints

Both the pension fund's regulatory framework and its organisation and investment process can impose constraints on the asset allocation, which can be detrimental on performance. In what follows, we will review their impact.

Pension fund regulation: impact on asset allocation and performance

The regulatory environment for funded pension schemes varies across countries. While the purpose of pension provision institutions worldwide is broadly similar, i.e., to safeguard retirees' welfare, national regulations are heterogeneous. Two different conceptions of financial regulation coexist: rule-based and risk-based (e.g., Ford, 2008). Rule-based regulation refers to inflexible requirements such as direct restrictions on investments. From a compliance perspective, rule-based regulation is appealing as it is simple and its ex-post verification is unambiguous. But some rules, such as investment limits, may in theory yield reduce risk-adjusted returns when they are binding. A number of reasons, such as the increasing complexity of financial instruments and the merging of pension funds' supervisory agencies with those for banks and insurers, have fostered the emergence of risk-based regulation. The aim of introducing this type of regulation is to ensure that institutions establish a sound risk management framework.

Risk-based regulation usually relies on quantitative financial models to determine the adequate level of buffer capital needed to withstand adverse financial market conditions. Using a methodology prescribed by the supervisor, funds identify and evaluate risk factors. It is therefore necessary to specify an underlying model in order to define, qualify, and/or quantify risks. This should in theory improve the regulatory framework. However, imposing a simplistic or inadequate model can also have some drawbacks. Shi and Werker (2012) demonstrate that substantial economic costs are incurred when regulatory risk constraints imposed on pension funds are shorter-dated than their long investment horizon. Severinson and Yermo (2012) and Boon Brière and Rigot (2016) show that risk-based regulation can induce procyclical investment, reducing the pension funds' capacity to keep risky exposure in crises times, which can threaten not only the funds' well-being, but also macroeconomic stability.

Many countries worldwide have gradually shifted from rule-based to risk-based regulation (OECD, 2010). In Europe, a regulatory revision has been proposed (EIOPA, 2012) to incorporate solvency regulations founded on risk-based concepts. Even if not applied yet at the European level, this proposed framework is very close to the one currently in place in some European countries. For example, the Netherlands. Denmark, Germany, Hungary, the Netherlands, and Finland, along with Australia and Canada, are among the pioneers of risk-based pension regulation. On the other hand, some Latin American countries have kept stringent portfolio limits. For example, Chilean funds had only been allowed to invest in fixed income in their nascent years, though the regulator gradually relaxed these limits over time and introduced risk-based regulation in 2011. Some countries display both rule-based and risk-based regulation. This is the case in Mexico, where investment restrictions exist alongside a daily value-at-risk constraint.

Using the largest publicly accessible dataset on pension investment returns worldwide, hand-collected from multiple sources, Boon Brière Gresse and Werker (2014) analysed the extent to which the type of regulation influences pension fund performance. Their panel regression analysis suggests that risk-based regulation is associated with a superior Sharpe ratio of real investment returns, and its merit increases for countries with low regulatory quality. Conversely, rule-based regulation slightly impairs the performance of countries with poor regulatory quality

Decentralisation and segmentation of the investment process

The investment management departments of pension funds (but also mutual funds and most institutional investors) are typically divided and structured into asset classes such as equities, fixed income, and alternative investments, and sometimes sub-asset classes like countries and sectors. This organisation is justified by the fact that to achieve superior returns through active management, portfolio managers need to acquire informational advantage though a high level of specialisation. This induces the firm's chief investment officer (CIO) to design the strategic asset allocation at the asset class level and then delegate portfolio decisions within asset classes to specialists. This leads to a two-stage decision process. In the first stage, the CIO allocates capital to the different asset classes, each managed by a team or a specialised asset manager. In the second stage, each team/manager decides how to allocate the delegated funds.

This two-stage process has a couple of drawbacks. First, it can lead to severe diversification losses, as the unconstrained (single-step) solution to the portfolio optimisation problem is likely different from the optimal linear combination of efficient portfolios in each asset class. Second, there may be differences in risk appetites and investment horizons between the CIO and each of the specialised team/asset managers. Typically, as managers are compensated on an annual basis, their investment horizon is generally shorter than the CIO. Last, for a pension fund facing liabilities, these affect the optimal portfolio choice at the aggregate level, but not the choices of unconstrained asset managers, who are typically evaluated against a fixed benchmark.

As shown by Van Binsbergen Brandt and Koijen (2008), this two-stage process can induce several misalignments of incentives and may lead to large utility costs at the aggregate level. They use a stylised investment management process (two asset classes: bonds and stocks, and three assets per class: government bonds and two types corporate bonds for fixed income, growth, intermediate, and value stocks for equities). They assume that the CIO acts in the best interest of a large group of beneficiaries, while the investment managers try to maximise their outperformance relative to a benchmark. They find that the costs of sub-optimal delegation range from 50 to 300 basis points per year. One way to reduce these costs is to consider the optimal design of managers' benchmark that reflect the assets' weights in the global optimal portfolio, and to select optimally the risk tolerance of each asset manager, which can substantially differ from the risk aversion of the CIO.

2 - Personalising the default asset allocation depending on individuals' characteristics

There is considerable heterogeneity among investors with respect to the characteristics of their human capital, their wealth outside of the pension plan (in particular their real estate exposure) and their coverage by the first pillar of the pension system. Therefore, individually managed accounts would be more appropriate than a single asset-allocation fund, since they can take into account these individual-specific characteristics when making asset allocation recommendations (Dahlquist et al., 2018).

2.1 - Human capital

Labour income is an important source of heterogeneity across individuals. An individual with labour income has an implicit holding of a non-tradable asset, human capital. The usual hypothesis in standard life-cycle models, that human capital can be proxied by a bond, has recently been challenged. Even for individuals with a safe labour position (such as civil servants), their rate of salary increase generally depends on the performance of the countries' economy.

Cocco, Gomes and Maenhout (2005) have shown empirically that the earnings profile of a typical worker exhibits a hump shape. Labour earnings grow at an increasingly higher rate until about age 45, and then they stop growing or even decrease until the employee retires. This implies a hump shape for the value of human capital, which in turn implies a hump shape for the optimal asset allocation in equities depending on investor's age. Investors should hold portfolios which are more conservative early in their working lives, become more aggressive as they approach middle-age, and then become more conservative. However, the share of human capital in total wealth at young ages is so large relative to financial wealth that investors still want to hold almost all of their financial wealth in equities. Their findings suggest that life-cycle funds should perhaps exhibit a slightly hump shaped equity allocation path instead of a monotonically declining path.

Benzoni, Collin-Dufresne, and Goldstein (2007) argue that aggregate labour income and dividends are cointegrated and exhibit a large, positive long-run correlation, even though they exhibit a low short-term correlation. The economic idea behind this assumption is that there are economic factors (e.g., cycles) that affect both labour income and capital income in the same direction. This positive long-run correlation implies a hump-shaped allocation to stocks over the working life of the investor. The intuition behind this result is that because of this long run correlation, young investors have their human capital strongly correlated with stock returns, which reduces their appetite to invest in the stock market.

The optimal asset allocation is also highly sensitive to the correlation of labour earnings with stock returns. However, there is considerable debate about this correlation. Benzoni, Collin-Dufresne, and Goldstein (2007) find a positive significant cointegration coefficient, but that has changed dramatically over time. For example, they estimate a cointegration coefficient of 0.20 when using US data going back to 1929, while the estimate is as low as 0.05 when using post-World War II data. For example, Cocco, Gomes and Maenhout (2005) find that this correlation is close to zero in the US, while Campbell *et al.* (2001) estimate correlations ranging from 0.33 for households with no high-school education to 0.52 for college graduates. Changing the assumed correlation between labour income and equities has a dramatic impact on the optimal asset allocation during the life cycle. For example, considering that labour income is cointegrated in the long run with equities means that young individuals have their human capital highly exposed to market returns. Their asset allocation should thus be tilted towards safe assets. For older individuals, the cointegration between labour income and dividends has less time to act. The present value of future labour income thus progressively acquires bond-like properties and it becomes optimal to place a larger fraction of financial wealth into the risky asset to offset the larger implicit bond position. Very close to retirement, the value of the bond shrinks as the individual has only a few remaining years to work and the optimal asset allocation converges to the solution ignoring labour income.

Recent academic research documents that individuals exhibit a large heterogeneity in terms of labour income (Guvenen et al., 2016, 2017), depending on where they lie in income distribution. Low and high-income individuals are more likely to be affected by income shocks. Bagliano et al. (2020) show that there are also large discrepancies in labour income risk by gender, women being more likely to be affected by income shocks (interruptions in their working career due to childcare or care for older family members) than men. One avenue for future product development would be to consider individualising the life-cycle path depending on individuals' labour income risk estimates (for example evaluated through a questionnaire).

2.2 - Real estate exposure outside of the plan

In real life, individuals usually have access to both pension plan and housing investments. They often borrow money to partially finance larger expenditures such as residential real estate. Badarinza, Campbell, and Ramadorai (2016) estimate the share of total wealth invested in real estate for a cross-section of 13 countries. Real estate exposure averages 55% of total wealth. There is, however, significant cross-country heterogeneity, with the minimum of 36.6% for Germany and a maximum of 77.4% for Slovakia, tangible asset holdings being related to the degree of a country's development. In developing economies, these figures are even larger, with real estate ownership above 75%, while only 60% of households hold any form of financial asset (Badarinza, Balasubramaniam, and Ramadorai, 2019).

Several academic papers consider the life-cycle decision problem with housing. Cocco (2005) and Yao and Zhang (2005) solve life-cycle models with both portfolio choice and housing decisions. They show that individuals for whom real estate is a higher fraction of their total wealth should invest less in risky assets. In their setting, a young individual has to tie up a large share of wealth in real estate and because he has borrowing constraints, he will thus invest little in stocks.

Chetty, Sandor, and Szeidl (2017) separate the effects of mortgage debt and home equity wealth (i.e., the value of the property net of mortgage debt). They confirm that increases in property value (assuming fixed home equity) generally reduce the stock share of liquid wealth by increasing illiquidity, increasing exposure to risk, and reducing wealth. In contrast, increases in home equity (assuming fixed property value) raise equities' share through a wealth effect (it increases the individual's total wealth and to keep equity exposure in total wealth constant, the share of the financial portfolio invested in equities should increase). Since property value is the sum of mortgage debt and home equity, increases in mortgage debt (assuming fixed home equity) are equivalent to increases in property value, and also reduce stockholding.

Finally, an individual's risk aversion might be considered endogenous. Housing represents a consumption commitment, and as such it can increase effective risk aversion (Grossman and Laroque, 1990; Chetty and Szeidl, 2007), which can in turn reduce equity exposure.

2.3 - Other pillars of the pension system

For most participants in DC pension plans, the first pillar ("pay-as-you-go" or "social security") pension can be an significant part of their retirement provision. In Thailand, the "Old Age Pension" (OAP) replaces 35% of the average pay for pensioners (ADB, 2020). The first-pillar pension can be considered as a risk-free investment in real bonds. The optimal individual life cycle strategy can be considered optimal for the total wealth, made of first and second pillars of the pension system. As for the case of a safe (bond-like) labour income, the availability of a first-pillar pension will lead to a larger risky investment. Over time, the ratio of first- and second-pillar wealth will change due to investment returns on second-pillar wealth, which may be above or below those of the first pillar part (assumed to be equal to risk-free returns). If the second-pillar returns are above the risk-free rate, then the second pillar becomes a larger share of the total pension wealth, and its risky investment should be reduced to keep the same exposure to risky assets.

3 - Integrating ESG into the strategic asset allocation

There is increasing appetite from pension plan members for socially responsible (SR) investment (Bauer, Ruof and Smeets, 2020; Brière and Ramelli, 2021a). In this section, we discuss the performance of SR investment, in particular the relationship between firms' corporate social responsibility (CSR) policy and their financial performance, and the impact on expected returns of shifting investors' preferences towards ESG. Finally, we discuss the role of institutional investors' active ownership.

3.1 - Firms' corporate social responsibility (CSR) and financial performance

There is a large debate on the relationship between firms' CSR and their financial performance. For example, focusing just on the pricing of firms' CO2 emissions, some previous empirical evidence shows that environmentally sustainable firms tend to outperform (see, e.g. In, Park and Monk, 2019), while others find that firms with higher CO2 emissions earn higher returns (Bolton and Kacperczyk, 2021). Meta-analyses show that academic findings are mixed (e.g., Margolis et al., 2009). One of the reasons for this conflicting evidence is related to limited data availability, the potentially changing relationship between CSR and firms' financial performance over time (Drei et al., 2019), and the absence of standardised measures of environment and social performance (e.g., Berg, Koelbel and Rigobon, 2019). Moreover, one major issue when trying to evaluate the causal impact of CSR on firms' performance is the so called "endogeneity issue". Are firms doing well by doing good vs are they doing good by doing well?

Research studies not only vary in their sample period and ESG data used, they also differ substantially in terms of methods used. For example, some research uses event studies to assess the impact of an exogenous, environment-related event on a firm's stock price (for example, environmental data releases or regulation enactments; or a firm-specific news). Event-study approaches focus on short-time windows around an event, which may limit the endogeneity problem, but also make their scope more limited. Regression analyses can be used to examine the relationship between CSR and financial performance within a larger sample. However, simple regression studies cannot differentiate between correlation and causality (Kruger, 2015). Papers using regression discontinuity design (e.g., Flammer, 2015) attempt to demonstrate that corporate environmental actions, such as the passage of an environmental resolution by a close margin, have a causal impact on economic success and thus firms' value. Finally, some researchers use portfolio analysis to evaluate the performance of investing in environmentally sustainable firms: they form portfolios sorted by firms' ESG policies and compare the average abnormal returns of those portfolios (In, Park and Monk, 2019, Drei et al., 2019).

The theoretical arguments explaining how a firm's sustainability might affect its value are also debated (Ferrell et al., 2016). Some argue that a firm's environmental or social improvement may not be compatible with profit maximisation. They regard a firm's environmental or social activity as a manifestation of managerial agency problems, which might destroy shareholder wealth (e.g., Friedman, 2007). Others see environmental improvement as a risk-mitigation instrument and source of market competitiveness in a world rapidly transitioning to lower-carbon technologies (e.g., Porter and Kramer, 2011). On the investors' side, stocks of firms with bad CSR policies (for example high CO2 emissions) could be considered as "sin stocks"; and be shunned by socially responsible investors, which could lead to significantly depressed valuations (and expected returns more attractive going forward). But it could also be that the risks are underpriced and not fully integrated by investors, who ignore information about global warming and its related risks.

3.2 - Impact of investors' changing preferences towards ESG

The past decade has seen significant changes in the way investors perceive environmental risks and this has led to tremendous growth in climate-conscious investing. More than 3000 organisations have become signatories of the United Nations

Principles of Responsible Investment (PRI).[2] There are several reasons for this. First, the information available on climate-change costs (for example on extreme weather events such as major hurricanes or wildfires) has grown considerably. In addition, regulatory initiatives have emerged, especially in Europe (the European Commission action plan for sustainable finance, green taxonomy, European labels, etc.), to improve the transparency of available climate information and encourage investors to take environmental criteria into account in their portfolio construction. Many initiatives have emerged, bringing together bankers or investors (such as the Climate Finance Leadership Initiative / Climate Action 100+ and Principles for Responsible Banking) for joint actions such as engagement or divestment campaigns (Dimson, Karakas and Li, 2020). Finally, individual investors' appetite for responsible investments has also increased considerably (Eurosif, 2020; Brière and Ramelli, 2021a).

These changes in investors' concerns for the environment have several consequences. On the one hand, they modify investors' appreciation of climate risks, e.g., the way investors incorporate fundamental climate information into asset prices. On the other hand, they can modify investors' demand for green assets by changing their relative preferences for the different types of investments available, such as "green" and "brown". Several theoretical works suggests that investors' preferences for green assets affect stock prices (e.g., Heinkel et al., 2001; Pastor et al., 2020; Pedersen et al., 2020). In particular, the model in Pastor et al. (2020) predicts that green assets should outperform following unexpected upward shifts in investors' environmental preferences. However, from an empirical perspective, identifying those shifts is far from obvious.

Both climate risk and changing investors' preferences can potentially have an impact on asset valuations. When we observe an increase in the price of green assets relative to conventional assets, we do not know whether this price change is related to the incorporation of fundamental information or to a change in investor preferences.

Brière and Ramelli (2021b) tackle this question and propose a way to estimate the changes in investors' preferences for green assets that are not related to fundamental information, and to measure their impact on long-term equity returns. To do this, they evaluate arbitrage activity on the climate ETFs market and estimate the changes in investor appetite for this theme, which are not yet incorporated in the value of the underlying securities that make up these ETFs. By measuring the difference between these arbitrage flows on green and conventional ETFs, they can obtain an estimate of the non-fundamental demand for green assets. They find that green sentiment influences the value that investors attach to corporate environmental responsibility as priced by stock markets. A one-standard-deviation higher green sentiment is associated with an outperformance of a one standard-deviation more environmentally responsible firm of approximately 30 basis points over a one-month horizon and 60 basis points over a six-month horizon, net of the effects of other firm characteristics and sector. The effect of green sentiment is independent from, and additional to, the effect of the news-based climate risk. Investor environmental preferences also have an impact on real corporate decisions. Higher green sentiment is associated with an increase in firms' capital expenditures and cash holdings.

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[2] *https://www.unpri.org/annual-report-2020/foreword*

Understanding the effects of investors' changing preferences for ESG on assets returns and real economic outcomes is crucial. These changing preferences can have a key impact on the expected returns of SR vs conventional investment going forward, which in turn influence firms' cost of capital and incentives to transition to a greener economy. This is particularly important in countries such as Thailand, which have set ambitious GHG emission reduction targets under the Paris Agreement.

3.3 - The role of active ownership

Large institutional investors, which own diversified and long-term portfolios, are often universal owners, with substantial equity stakes in most firms (Mattison *et al.*, 2011; Brière Pouget and Ureche-Rangau, 2019). This exposes them to the risks of large externalities resulting from environmentally and socially irresponsible firms' behaviour. Shareholder activism, which refers to investors' influence on firms' policy though the use of an ownership position, can be a key tool at their disposal to have an impact on firms' decisions. Environmental and social activism is often motivated by a misalignment of preferences between shareholders and management. In the presence of externalities generated by the firms, it will be in investors' interest to minimise the potential costs of those externalities by influencing the firms' businesses. Shareholder activism can take various forms. The most popular ones are (1) exiting (selling shares), (2) voting actively at general meetings, and (3) engaging behind-the-scenes with the firms' management and board (Bekjarovski and Brière, 2018).

The various forms of shareholder activism

Shareholders who are dissatisfied with firm policy may choose to sell their shares. The threat of exit can potentially have a large impact on firms (Admati & Pfleiderer, 2009). Survey results suggest that exits due to poor performance are quite common and have been used by 49% of institutional investors (McCahery, Sautner & Starks, 2016).

Voting at general meetings is another way to influence companies' decisions. Institutional investors vote can easily cast votes through the platforms of proxy advisory agencies such as ISS. Support rates tend to be very high for management-sponsored proposals. Support for shareholder-sponsored resolutions is on the rise compared to the previous decade. Empirical evidence suggests that the most common voting pattern of institutional investors is to support board independence, oppose takeover defences and oppose unequal voting rights (dual class shares) (Appel, Gormley, & Keim, 2016). Mutual funds also tend to vote in support of shareholder proposals that are thought to be wealth-increasing (such as board, governance and compensation proposals). In recent years, with the development of socially responsible funds, they have increasingly supported environmental and social resolutions (Brière, Pouget and

Ureche-Rangau, 2019). Funds with larger and more concentrated funds, or with lower turnover, are more inclined to have an independent voting policy and to depart from proxy advisors' recommendations (Iliev & Lowry, 2014).

Behind-the-scenes engagement involves private communication between activist shareholders and the firm's board or management, which tends to precede public measures such as voting, shareholder proposals and voiced opinions. In a sense, the existence of other forms of public activism can be taken as a signal that behind-the-scenes engagements were unsuccessful. Writing to the firm's management or organising face-to-face meetings with the management or non-executive directors are more common behind-the-scenes engagement methods (Barko, Cremers & Renneboog, 2017). Needless to say, behind-the-scenes engagement is difficult to measure. However, surveys and proprietary databases shed some light on the prevalence and effectiveness of this channel. Early work suggested that private communication with management was done mainly by hedge funds (Brav *et al.* 2008). More recently, McCahery, Sautner and Starks (2016) find that 65% of their survey participants, representing a broad group of institutional investors, had direct discussions with management in the past five years.

Institutional investors interested in influencing corporate environmental practices have recently joined forces via common initiatives, such as the Climate Action 100+. Their goal is to influence corporate accountability and oversight of climate change risk and greenhouse gas emissions across the value chain. Participants in the initiative also seek to increase corporate disclosure in a manner that would help investors assessing the firms' sensitivity to climate change scenarios. Cooperation on social and environmental issues is also undertaken though the Principles for Responsible Investment (PRI) initiative. The mission of the initiative, representing the vision of signatories holding $59 trillion assets, is to incorporate ESG issues into investment and ownership policies. They also seek to increase corporate disclosure on ESG issues for their portfolio companies. The widespread popularity of these initiatives is consistent with the broad emergence of a new voluntary institutional corporate social responsibility infrastructure that aims to put pressure on firms in the absence of a global governance.

Impact of shareholder activism

There is a vast literature investigating the impact of shareholder activism on the performance and ESG ratings of targeted firms. The early empirical literature was sceptical of the view that investor voting can serve as an effective monitoring tool and have an impact on stock performance and firm operations (e.g., Gillan & Starks, 2007). Recent work is more supportive of the beneficial role of voting. Voting outcomes on specific issues, such as the adoption of governance proposals, have been shown to affect firm valuations, with an increase in shareholder value by 2.8% on average (Cuñat, Gine, & Guadalupe, 2012; Flammer, 2015). Doing independent vote research is significantly more costly than following proxy voting recommendations, but can be profitable for active owners. Iliev & Lowry (2014) analyse the effect of independent vote research on fund performance. Funds with high benefits to active voting, are less likely to follow ISS recommendations and tend to earn higher risk adjusted returns, suggesting that doing independent vote research can be profitable for active owners.

Early studies find a small impact of behind-the-scenes engagement on target firms' governance, and a negligible impact on the firm's value. This early evidence (see e.g., Smith, 1996) is based on the analysis of the engagements of large pension funds (e.g., CalPERS), mutual funds, or shareholders associations (e.g., the Council of Institutional Investors). The absence of impact was mainly attributed to inadequate monitoring and ownership dispersion. More recently, Becht, Franks, Mayer, & Rossi (2008) studied the governance engagements of the Hermes Focus Fund, a UK fund owned by the British Telecom Pension Scheme, and found that the engagement strategy led to an abnormal return of 4.9% net of fees. Dimson, Karakas & Li (2015) also provided favourable results on the effects of ESG behind-the-scenes activism of a large institutional investor with a major commitment to responsible investment. Successful engagement was followed by a yearly abnormal return of 4.4% and led to improved accounting performance and superior governance of the targeted companies. The most successful engagements target firms with reputational concerns and a higher capacity to implement corporate social responsibility changes. When it comes to pension fund activism, Barber (2007) found significant positive short run returns for CalPERS' activism through their use of a public focus list of target companies. However, the long-term effects of CalPERS activism tend to be statistically insignificant.

Overall, recent studies suggest that the market reaction to activism is positive, consistent with the view that activism creates shareholder value. Studies tend to support the view that active investors can make a profit from their engagements. Moreover, firms' ESG ratings tend to improve after successful engagements.

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