CASE STUDIES

"Case Studies" presents a case pertinent to contemporary issues and events in investment management. Insightful and provocative questions are posed at the end of each case to challenge the reader. Each case is an invitation to the critical thinking and pragmatic problem solving that are so fundamental to the practice of investment management.

PORTFOLIO MANAGER SELECTION — A CASE STUDY

Michael Christensen[a]

Within a delegated portfolio management setting, this paper presents a case study of how the manager selection process can be operationalized in practice. Investors have to pursue a thorough screening of potential portfolio managers in order to discover their quality, and this paper discusses how such a screening process can be performed—represented by a case study.

1 Introduction

The delegated portfolio management literature has primarily applied principal–agent models focusing on how an optimal compensation contract that disciplines the portfolio manager to act in the best interests of the investor can be developed. However, the general conclusion is that such contracts do not exist, see Stracca (2006) for a survey.

In practice, investors therefore have to set up a thorough screening process in order to differentiate potential portfolio managers (PM) from each other. In this paper we present a case study that

describes one (among others) way to perform such a selection process that contributes to a sound and thorough selection of PMs.

The case starts out by describing how an Investment Policy Statement (IPS) can be formed, and we address a number of issues relevant for the IPS including the degree of diversification, how to measure the risk of the portfolio, choice of benchmark and fee structure, etc. Then we discuss how a tender can be organized as a combination of written offers and oral presentations as well as we show how to develop a manager scorecard as a screening device. Finally, we present the decision process including the arguments applied in the manager selection process.

Obviously, there are different ways to perform such a manager selection process, but the contribution of this paper is to provide a sound academic

[a]Department of Economics and Business Economics, Aarhus BSS, Aarhus University, Fuglesangs Allé 4, DK-8210 Aarhus V. Denmark. E-mail:mic@econ.au.dk. Phone: +45 871 65 001.

background of one potential way of screening PMs.

In Section 1, we present the background of the case study and the investor's Investment Policy Statement, and in particular we discuss the considerations that the investor had when he formulated his IPS. Then in Section 2, we turn to the screening process that the investor carried out, and we present the results of the case, including the manager scorecard that formed the basis for the selection of PMs. Section 3 concludes.

2   Background and Investment Policy Statement

This case is a real case describing a company within the utilities sector. However, the company is anonymized. The investor (the company) has an investment amount of $90 million and requires that the investment is capital-preserving with low risk.

As a first step, the investor defines his IPS which specifies the requirements that the investor wants potential PMs to adhere to, i.e. the IPS forms the basis for the contract that the investor must negotiate with the PMs selected. The IPS is inspired by the recommendations of the CFA Institute (2010), and the IPS is presented in Table 1.

First, we infer from Table 1 that the investor has decided that mandates should be discretionary and balanced.

A discretionary mandate implies that the PM makes all decisions as to which assets to buy and sell, i.e. the investor delegates not only his endowment but also the decision power to the PM. As opposed to this, under an advisory-based mandate the PM has to have the acceptance from the investor of any trades he wants to pursue before trading.

An important argument in favor of discretionary mandates is that evidence shows that discretionary mandates provide better risk diversification across PMs compared to advisory-based mandates. Christensen *et al.* (2015a, 2016) analyze a number of high-net-worth investors in terms of portfolio diversification, and they find that utilizing multiple PMs, the total portfolio risk can on average be reduced by up to 26%. They document that this effect is very different between discretionary mandates and advisory-based mandates. In fact, if a mandate is advisory-based, the risk reductions are only around 11–12%, whereas discretionary mandates may find risk reductions of up to 39%. The reason for this result is that under an advisory-based mandate, the investor himself makes all the decisions of assets to be bought or sold, and therefore his opinion shines through all trades made, irrespective of the trades being pursued by this or that PM.

However, a discretionary mandate requires that the investor has to be much more specific as to the content of the IPS that PMs have to adhere to compared to the case of an advisory-based mandate, simply because he has to formulate much more detailed restrictions in order to discipline the PM.

The choice of balanced mandates as opposed to specific asset class mandates is motivated by the fact that if portfolio management delegation has to be meaningful, it must include the asset allocation process. For balanced mandates the investor delegates both the asset allocation and the asset selection decisions to the external PM, whereas only the asset selection decision is delegated under a specific asset class mandate. Brinson *et al.* (1986) show that up to 90% of the portfolio return is due to a successful asset allocation, whereas a successful asset selection only counts for up to 10% of portfolio returns. If the investor decides to have specific asset class mandates, he

Table 1 Investment Policy Statement.

Mandate	Discretionary and balanced
Investment horizon	4–7 years
Standard deviation (calculated on weekly returns for the recent year)	Max. 5.00%
Interest rate risk (Macaulay duration)	Max. 4 years
Exchange rate risk (forwards)	Exchange rate risk on fixed income assets must be covered at any time
Credit risk	Fixed income assets must be Investment Grade at any time
Liquidity risk	Portfolio must be able to be realized within 1 week
Stop-loss	If the portfolio value decreases by 5% (since inception), the PM must contact the investor
Geography	Global mandate
Assets allowed	Money market instruments
	Government bonds
	Corporate bonds
	Listed equities
	Currency forwards on a covered basis
Assets not allowed	Hedge funds
	Structured products
	Derivatives (except currency forwards)
	Mutual funds
	ETFs
Asset restrictions	At least 50 securities
— Cash	Max. $100,000
— Fixed income	Must be denominated in USD
— Equities	Max. 35% and at least 25 individual equities
— Emerging markets	Max. 25%
Ethical screening	Securities must comply with the MSCI ESG screening
Benchmark	3 months LIBOR + 3.50%
Fee	All-in fee that includes management, trading, custody and third parties

leaves the most important investment decisions (the asset allocation decisions) to himself, and in fact he ends up paying an external PM to manage the investment decisions (the asset selection decisions) which count less. Furthermore, the benefits of risk diversification may be ruled out, simply because the investor himself becomes responsible for any mean–variance optimizations. Generally, he will not be able to balance the asset classes as easily as the PMs, because he has to move funds among PMs in order to change the asset allocation, which may result in an in-optimal utilization of correlations across asset classes.

Secondly, the argument that some PMs are able to obtain superior performance systematically in specific asset classes is not very strong, see Carhart (1997) who finds that previous findings in favor of mutual fund performance persistence can be explained by survivorship biases and persistent transactions costs. In addition, Carhart concludes that his "results do not support the existence of skilled or informed mutual fund portfolio managers", i.e. PMs seem not to systematically outperform either market benchmarks or their peers ruling out any advantages of specific asset class mandates.

Finally, pursuing the specific asset class mandate approach, the investor will have to make individual IPSs for each asset class, and each PM will have his own IPS specific to the asset class that he is in charge of. This makes it almost impossible to make performance evaluations across PMs, since they are operating on different IPSs.

Next, we infer from Table 1 that the investor has defined a number of risk requirements resembling a low-risk tolerance matching an investment period of 4–7 years. His overall risk tolerance is measured by a standard deviation (SD) of 5% resembling that with 95% probability (under the normality assumption) he will not accept a loss of more than 9% within 1 year, i.e. his 95% VaR is 9%. This mimics an SD of $9/1.645 = 5.47 \approx 5\%$. In particular, the investor has specified that the SD must be calculated using weekly returns from the most recent year.

To complement the overall SD, the investor has defined that the portfolio interest rate risk measured by the Macaulay duration must not exceed 4 years, and in terms of exchange rate risk the investor requires that any exchange rate risk related to fixed income assets must be covered at any time due to the negligible small YTMs at present. Moreover, the investor has decided to keep the credit risk of the portfolio low by

allowing only investment grade corporate bonds ruling out the high-yield segment. Furthermore, he wants the portfolio to be extremely liquid by specifying that it should be possible to liquidate the portfolio within 1 week. Finally, the investor incorporates a kind of overall stop-loss mechanism in that he requires any potential PM to contact him, if the total portfolio value should fall by 5% (or more) since portfolio inception.

The SD sets the overall risk tolerance of the portfolio but in addition the investor has set certain restrictions on the assets and asset classes allowed in the mandates. Generally, the investor wants a global mandate without making prior restrictions on geographical areas, but not all asset classes are allowed. Keeping in mind that the investor is a conservative investor with a low-risk tolerance, this investor will only allow money market instruments, government and corporate bonds, and listed equities. Furthermore, currency forwards are allowed but only on a covered basis in order to cover exchange rate risk on fixed income assets, as mentioned above. Hereby, the investor rules out hedge funds, structured products and derivatives (except currency forwards).

Moreover, this investor wants only to invest in single-line assets, i.e. mutual funds are not possible investment vehicles. The reasoning here is that mutual funds are much less transparent and more expensive than a single-line portfolio. Also, the investor will not accept ETFs in his portfolio. Although active managers often argue that ETFs are particularly attractive as an investment vehicle suitable for quick changes of risk exposure, this investor believes that ETFs are incompatible with an actively managed portfolio.

To complement the overall restrictions discussed above, this investor adds specific restrictions on asset classes. First, he specifies a maximum amount of cash of $100,000 in order to avoid the risk of the PM going bankrupt. Second, he sets a

limit of equities of 35% and on emerging markets of 25%. The investor believes that these limits comply with the overall SD of the portfolio of 5%. However, defining an overall SD of the portfolio, this has to be consistent with the return requirement in order to avoid any potential risk/return conflicts. We address this issue below, when we discuss the benchmark.

Financial markets are exposed to unexpected shocks all the time, and such shocks are difficult to predict, which requires a high degree of diversification. The investor recognizes that it is not sufficient just to include various asset classes in the portfolio; also, it is necessary to secure that within each asset class the number of securities is significant. Unfortunately, the academic literature is unable to guide us as to how many securities to include in a portfolio, and academics have disputed this issue for decades. The pioneering paper by Evans and Archer (1968) argues that most unsystematic risk can be diversified by just including 10 securities in a portfolio. On the contrary, Statman (1987) argues that at least 30 to 40 securities are needed to obtain a satisfactory diversification, and O'Neil (1997) notices that American mutual funds hold on average 78 securities, and he advocates that investors invest in more than just one fund, implying that the portfolio will include more than 100 different securities. In the financial industry, a rule of thumb is that at least 50–60 securities should enter a portfolio if it is to be considered well diversified. In the present case, the investor requires a minimum of 50 securities.

Likewise, within each asset class a certain number of securities need to be included. If a portfolio comprises 50 securities in total, but only 5 equities, the equity asset class cannot be considered to be sufficiently diversified although the overall portfolio is diversified. In this case, the investor requires that at least 25 individual equities enter the portfolio.

In addition to the above-mentioned issues, the investor is concerned about CSR and therefore he demands that PMs perform ethical screening of all securities, companies and sovereigns.

The final two issues specified in the IPS concern the benchmark and the fee structure. First, in this case the investor has defined an absolute benchmark of 3 months LIBOR + 3.50%. Here, focus is on positive returns making absolute benchmarks particularly relevant for capital-preserving mandates. In addition, the absolute benchmark has the advantage that it is variable, i.e. if the general level of interest rates goes up, the benchmark goes up as well, represented by the LIBOR rate. As argued by Christensen (1999), the benchmark has to mimic the IPS as closely as possible, and formulating the absolute benchmark in this way, the investor believes that the margin of 3.50% is set in accordance with the IPS's other components, particularly the risk tolerance. His considerations have been that the margin should be set high enough for the PM to find it challenging, but not so high that the PM gives up beating it. Finally, it is worth pointing out that applying an absolute benchmark in this way does not rule out the possibility of relative benchmarking. By utilizing several PMs, relative benchmarking across PMs can easily be performed.

Second, concerning the fee structure it is of utmost importance for the investor that all PMs charge their fee in a similar way such that portfolio fees are directly comparable across PMs. For years, the usual practice has been that investors had to pay a number of different fees representing management, brokerage (trading), custody and third party. However, PMs have recently accepted to quote all-in fees that comprise all the above-mentioned four components. All-in fees provide much more transparency, and they are easier to compare across PMs as opposed to a fee structure comprising the four individual fees. Furthermore,

the all-in fee is independent of the trading volume contrary to brokerage and third-party fees. The all-in fee is usually calculated as a percentage of the portfolio value and only if the portfolio value increases, the all-in fee increases. Furthermore, the all-in fee has the advantage that it is directly comparable across PMs, and that no further costs appear besides potential taxes (but these are usually very small), i.e. at year-end, the total fee that the investor has paid must be exactly equal to the percentage agreed upon. This motivates why the investor has chosen an all-in fee structure.

3   The manager screening process and manager scorecard

In order to be able to distinguish between high-quality and low-quality PMs, the investor decides to organize a tender which induces a competition effect among the PMs. Competition among PMs will usually have a downward effect on the fees they offer and the PMs, once engaged, will be aware that their performance is compared with the performance of the other PMs (their peers), which will discipline them in terms of herding behavior. Scharfstein and Stein (1990) argue that herding behavior among portfolio managers, although inefficient, can be rationalized by the fact that PMs are concerned about their reputation. Finally, the PMs know that their performance is compared with the other PMs' performance, and they are aware that they can readily be replaced by another PM if their performance is not satisfactory.

In this case, potential PMs are selected based on their historical performance and Morningstar rankings, and a total of six PMs are invited to participate in the tender. Prior to the tender, the investor has decided that he will utilize three PMs in order to be able to compare their performance, and therefore he considers that a pool of six potential PMs from which to choose three PMs is sufficient.

This is motivated by Christensen *et al.* (2016), who analyze 21 high-net-worth investors engaged in 83 different mandates. They find that portfolio SDs can be reduced by up to 26%, and the largest diversification effects are obtained for 3–6 PMs.

The tender is organized such that the six potential PMs each submit a written offer. This offer must comply with the IPS and be specific as to:

— each single-line security that is recommended for the portfolio.
— expected portfolio return for the next 12 months.
— risk measures in terms of SD and Macaulay duration.
— degree of diversification in terms of geography, currencies, and sectors.
— all-in fee.

After submitting the offer, the investor designs a manager scorecard (MS) which will form the basis for meetings with the potential PMs. At these meetings, the PMs present their offers. The meetings are essential to give the investor an impression of the trustworthiness of each PM, and the final decision as to which PMs to engage rests to a large extent on whether the PM appears credible. The competition between PMs is a first step towards disciplining them, and the offers they provide and their oral presentations give the investor a sound foundation for analyzing their skills.

To structure the offers, the investor uses the MS to obtain a systematic comparison across PMs in terms of strengths and weaknesses, and in particular to infer how the offers comply with the IPS. The MS, which the investor has designed, is presented in Table 2.

The 6 PMs are anonymized, and we infer that there are important differences between them. If

Table 2 Manager Scorecard.

	Criteria	PM I	PM II	PM III	PM IV	PM V	PM VI
Diversification — total # of assets	≥ 50	47	55	54	50	71	84
Diversification — # of equities	≥ 25	25	28	20	26	32	47
Diversification — geographically		No	Yes	Yes	No	Yes	Yes
Diversification — GICS sectors		No	Yes	No	No	Yes	No
Expected return, 12 months, %	3.50	2.40	3.00	2.49	2.20	3.50	3.53
Standard deviation, %	5.00	3.54	3.05	2.34	2.90	3.30	4.40
Sharpe ratio	0.70	0.68	0.98	1.06	0.76	1.06	0.80
Macaulay duration	4.00	2.51	3.00	3.63	3.55	3.04	3.64
Investment Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Equities, %	0–35	20	18	18	15	25	22
Government bonds, %	0–100	80	57	52	35		
Corporate bonds, %	0–100		25	30	50	75	78
Cash, %	$100,000						
Currency forwards	Covered	Yes	Yes	Yes	Yes	Yes	Yes
Emerging markets, %	25	1	4			4	
Geography	Global	No	Yes	Yes	No	Yes	Yes
Fixed income — currency	USD	Yes	Yes	Yes	Yes	Yes	Yes
Listed companies only	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethical screening	MSCI ESG	Yes	Yes	Yes	Yes	Yes	Yes
Fee, %	All-in	0.375	0.525	0.50	0.35	0.55	0.55

the PM fulfills a specific criterion in the IPS, the cell is green, otherwise it is marked as red.

The MS specifies the PM's ability to suggest a portfolio that is well diversified in terms of the number of assets, asset classes, geography and sectors. A high-quality PM ought to include all of those asset classes that are allowed according to the IPS. Excluding an asset class can of course be motivated by expectations of low or negative returns for that particular asset class, but in general, all asset classes allowed should enter the portfolio.

Furthermore, the portfolio diversification can be enhanced by including as many of the 10 GICS sectors (financials, health care, industrials, consumer stables, consumer discretionary, energy, utilities, materials, information technology and telecommunication services) as possible among the equities and corporate bonds in the portfolio.

Also, diversification across countries and currencies plays a role. The home-bias puzzle has been well documented, e.g. French and Poterba (1991) argue that US equity investors allocate almost 94% of their investments to US equities although the US equity market counts less than half of the world's equity markets. This puzzle seems to remain despite the fact that many

analyses have documented the benefits of international diversification, see Goetzmann *et al.* (2005). Also, various explanations have been put forward, e.g. Coval and Moskowitz (1999), who argue that US investment managers exhibit a strong preference for locally headquartered firms that produce nontraded goods.

Also, the MS presents for each PM his expected 12 months return and the associated SD and Macaulay duration. Based on this information, the investor can determine whether the PM is able to fulfill the benchmark requirement of 3 months LIBOR + 3.50%. Equivalently, the investor can compare the risk-adjusted returns measured by the Sharpe ratio across PMs.

Furthermore, the MS presents for each PM the share of equities compared to the share of bonds, which provides valuable information to the investor about how each PM views the temperature of the financial markets and the underlying macro economy.

The MS combined with the oral presentations constitutes a balanced foundation for screening the PMs. PMs want to signal that they are high-quality PMs, and usually they only focus on their historical performance and their Morningstar rankings. However, the historical performance is not a guidance of future performance, and the historical performance that PMs tend to present is often not risk-adjusted, and therefore it seldom gives the right picture. Also, the Morningstar rankings may be misleading. Morningstar groups funds into different categories, and their rankings are within each group. This means that 1 fund receiving 5 stars by Morningstar, although being the best performing fund within that particular group, may in fact be a bad performing fund compared to all funds.

Based on these observations, the historical performance and Morningstar rankings do not enter the

MS directly, and therefore this information will not influence the decision as to which 3 PMs to engage. But as mentioned previously, the historical performance and Morningstar rankings were used as a screening device for the selection of the pool of the 6 potential PMs, and consequently this information plays a role indirectly.

We can now turn to a presentation of the specific details of each PM as given by the MS in Table 2. Only PM V has pure green cells, i.e. he fulfills all criteria, and PM II and PM VI both have only 1 red cell. For PM II this is due to his expected 12 months return being only 3.00%, which is lower than the investor's benchmark of 3.50% (assuming that the 3 months LIBOR rate is zero, which is only approximately true). However, PM II has suggested a portfolio with a standard deviation of 3.05%, yielding a Share ratio of (3.00/3.05) 0.98 which is higher than the investor's Sharpe ratio requirement of (3.50/5.00) = 0.70. Therefore, although his absolute return expectations do not fulfill the investor's absolute return requirement, his risk-adjusted return requirement is met. In addition, PM VI has only 1 red cell due to his portfolio lacking sector diversification, i.e. he has suggested a portfolio which does not include all 10 GICS sectors among the equities and corporate bonds.

For the remaining 3 PMs, we see from Table 2 that they have several red cells. A common problem for these PMs is that their absolute return expectations are lower than the investor's absolute return requirement. Furthermore, for PM I and PM IV, the suggested portfolios are not globally diversified due to a home-bias tendency. Equally, they both lack sufficient sector diversification. In addition to this, PM I suggests a portfolio that does not include 50 assets in all, and therefore it cannot be considered well diversified. Furthermore, the portfolio suggested by PM I does not fulfill the Sharpe ratio requirement.

Finally, PM III suggests a portfolio which does not fulfill the absolute return requirement. Also, this portfolio is not sufficiently diversified in terms of sectors. Moreover, this portfolio includes less than 25 equities, and therefore it is not well diversified in relation to that particular asset class.

All the PMs fulfill the standard deviation and duration requirement. In addition, they have all suggested portfolios that only include Investment Grade corporates, and the currency exposure is hedged. Also, the asset class restrictions are fulfilled, and all PMs perform ethical screening.

Considering the all-in fee, we see huge differences. PM IV charges an all-in fee of only 0.35%, whereas PMs V and VI both charge an all-in fee of 0.55%.

Based on the MS in Table 2 and the meetings held, the investor considers all PMs except 1 (PM IV) to be high-quality PMs. The investor is particularly interested in getting information about each PM's investment process, i.e. whether he uses a top-down or a bottoms-up approach. Apart from PM IV, the PMs use a top-down investment process, i.e. they start out with macroeconomic analyses and based on these, they determine their asset allocation and eventually they choose the specific securities and their tactical asset allocations. The investor approves of this approach, since it is in alignment with the CFA recommendations that the strategic asset allocation process (planning) comes prior to the security selection process (execution).

PM IV, on the contrary, uses a bottoms-up process focusing on the valuation of individual securities, and his asset allocation seems more or less random. Based on this observation, the investor decides to disregard PM IV. Among the remaining 5 PMs, it turns out that their macroeconomic approaches differ. One PM uses the OECD (CLI) leading indicators, whereas the other 4 PMs apply

analytics developed by themselves. However, in the portfolio optimization process, only 1 PM (PM II) uses Markowitz mean–variance optimization. The overall impression, though, is that they all seem to be competent and serious in designing their investment processes.

A notable difference across PMs in Table 2 is that the 12 months expected return for 4 out of 6 PMs is lower than the investor's benchmark of 3 months LIBOR + 3.50%. At the meetings, the investor confronts each PM with his 12 months return forecast. In particular, the 4 PMs who do not fulfill the benchmark requirement are asked why they suggest a portfolio which is not able to meet the benchmark criterion. The answers differ slightly across PMs, but the general argument is that they are reluctant (for the time being) to take on the risk that is necessary to obtain a return that is sufficiently high enough to meet the benchmark requirement.

Despite these differences, the investor ends up selecting PMs II, V and VI. Although they are the most expensive PMs, they suggest portfolios that match the IPS very closely, they use a top-down analytical approach, and one of those (PM II) uses Markowitz mean–variance optimization. Furthermore, they are the PMs with the highest 12 months expected return, which turns out to be an important criterion for the investor. Although they also suggest portfolios with relatively high risk levels, the investor argues that still the risk is within the limit and the risk-adjusted returns seem reasonable.

After deciding which 3 PMs to engage, the question arises whether they should be allocated equal amounts? In Christensen *et al.* (2015b), it is analyzed whether different mean–variance optimization models using various input parameters such as EWMA, GARCH and Bayes–Stein can outperform a simple naïve model of equal PM

weighting, and they find that the advanced mean–variance models are not able to systematically outperform the naïve strategy of equal weighting. Therefore, there is no reason to differentiate the amount allocated to the PMs, and since the total investment amount is $90 million, the investor decides to allocate $30 millions to each of the 3 PMs selected.

4   Conclusion

Unfortunately, the delegated portfolio management literature concludes that an optimal compensation contract that solves the imperfect information problem between investors and PMs cannot be defined. This implies that investors delegating funds to external PMs have difficulties separating high-quality PMs from low-quality PMs.

Despite this result, in practice, investors do delegate funds to external PMs, and this paper has presented a case study of a portfolio manager selection process. The important ingredients in this process have been the Investment Policy Statement, a manager screening process incorporating a tender and a manager scorecard. The purpose of presenting this case study has been to show at least one way of conducting such a portfolio manager selection process.

Although this may not be a first-best method due to lack of incentive compatibility contracts, the case study presented here gives a second-best illustration of how investors can separate high-quality PMs from low-quality PMs, and from a practical angle, the methodology suggested here will probably produce a screening that will suffice for most purposes.

Acknowledgment

References

Brinson, G. P., Randolph Hood, L., and Beebower, G. L. (1986). "Determinants of Portfolio Performance," *Financial Analysts Journal* July/August, 39–44.

Carhart, M. M. (1997)."On Persistence in Mutual Fund Performance," *The Journal of Finance* **52**, 57–82.

CFA Institute (2010). *Elements of an Investment Policy Statement for Individual Investors*, CFA Institute.

Christensen, M. (1999). "The Optimal Choice of a Benchmark Portfolio," *The Journal of Private Portfolio Management* **2**, 49–53.

Christensen, M., Christensen, M. V., and Gamskjaer, K. (2015a). "Delegated Portfolio Management and Diversification," Working Paper, Aarhus University.

Christensen, M., Christensen, M. V., and Gamskjaer, K. (2015b). "Delegated Portfolio Management and Optimal Allocation of Portfolio Managers," *Applied Economics* **47**, 2142–2153.

Christensen, M., Christensen, M. V., and Gamskjaer, K. (2016). "Delegated Portfolio Management and Diversification," *Applied Economics Letters* **23**, 255–258.

Coval, J. D. and Moskowitz, T. J. (1999). "Home Bias at Home: Local Equity Preference in Domestic Portfolios," *The Journal of Finance* **54**, 2045–2073.

Evans, J. L. and Archer, S. H. (1968). "Diversification and the Reduction of Dispersion: An Empirical Analysis," *The Journal of Finance* **23**, 761–767.

French, K. R. and Poterba, J. M. (1991). "Investor Diversification and International Equity Markets," *American Economic Review* **81**, 222–226.

Goetzmann, W. N., Li, L., and Geert Rouwenhorst, K. (2005). "Long-term Global Market Correlations," *Journal of Business* **78**, 1–38.

O'Neil, E. S. (1997). "How Many Mutual Funds Constitute a Diversified Mutual Fund Portfolio?," *Financial Analysts Journal* March–April, 37–46.

Scharfstein, D. S. and Stein, J. C. (1990). "Herd Behavior and Investment," *The American Economic Review* **80**, 465–479.

Statman, M. (1987). "How Many Stocks Make a Diversified Portfolio?," *Journal of Financial and Quantitative Analysis* **22**, 353–363.

Stracca, L. (2006). "Delegated Portfolio Management: A Survey of the Theoretical Literature," *Journal of Economic Surveys* **20**, 823–848.