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Bigger Is Better
Defined Contribution Menu Choices With Plan Defaults

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Abstract

Prior studies of core investment-menu size in defined contribution plans found that smaller menus improve employee participation rates by reducing choice overload. The widespread adoption of automatic enrollment and default investments requires revisiting this research to determine its continued relevancy. Using data from more than 500 defined contribution (DC) plans with approximately a half-million participants where core menus vary between approximately 10 to 30 investment options, we find that acceptance of the default investment option increases by approximately 0.7% for each additional fund in the core menu. Additionally, portfolio efficiency increases among self-directing participants with access to large core menus because they tend to hold more funds, which results in more-diversified portfolios. Our findings suggest that increasing a plan menu from 10 to 30 funds could result in an approximate 10-basis-point increase in the total expected risk-adjusted return (i.e., alpha) for a defined contribution plan when considering the dual benefit of higher default investment acceptance and more-efficient portfolios among participants who choose to build their own portfolios.

Bigger Is Better: Defined Contribution Menu Choices With Plan Defaults

The Pension Protection Act of 2006 (PPA) allowed employers to automatically enroll workers into investment defaults within DC plans, leading to a significant increase in participation rates and a reduction in self-directing participants (Butrica, Dworak-Fisher, and Perun, 2015). Many studies of participant behavior relied on by plan sponsors, consultants, and investment advisers were conducted prior to the introduction of the PPA. Features such as smaller core investment menus, which improved investment performance in the absence of high-quality default investments, may not have the same effect when self-directed participants are required to reject the default.

Early studies found that increasing the number of available funds reduces participation rates as a result of a phenomenon known as choice overload (Chernev, Bockenholt, and Goodman, 2015). For example, Iyengar, Huberman, and Jiang (2004) found that participation rates decline by approximately 1.5% for each additional 10 funds in the core menu. Faced with a more-complex choice, participants tended to avoid making a choice because the options were too difficult to evaluate (Iyengar and Lepper, 2000).

Post-PPA, choice deferral most often results in the selection of a target-date fund or lifecycle fund as the plan default investment. Funds that meet the PPA's definition of a qualified default investment alternative, or QDIA, are often well-diversified, inexpensive, and of an age-appropriate mix of stocks and bonds (ICI, 2019). Less-sophisticated investors are significantly more likely to stick with QDIAs when defaulted into them (Goda, Levy, Manchester, Sojourner, and Tasoff, 2019), resulting in what is an improvement in portfolio quality among average workers who are not tempted to self-direct.

An optimal plan menu will provide a limited selection of funds when workers will either invest in a suboptimal cash fund or choose not to participate. Post-PPA default investments, however, significantly outperform self-directed portfolios (Financial Engines and Aon, 2016). When the default provides a more-efficient portfolio than what the average workers could build themselves, adding funds to the plan menu may encourage more participants to remain in the default because of choice overload. Sophisticated investors who are capable of overcoming choice overload may reject the default investment in favor of a customized portfolio drawn from a larger plan menu.

This paper explores the relationship between core menu size with these two key participant-investment decisions: the acceptance of the plan default and the efficiency of portfolios selected by those who create their portfolio from nondefault investments. Using a dataset that includes more than 500 defined contribution plans with approximately a half-million participants, where core menus vary between approximately 10 to 30 investment options, we find that default acceptance increases for DC plans with larger core menus, and that portfolios constructed by self-directed participants in plans with more funds have higher risk-adjusted returns. Self-directed investors with access to larger

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menus hold more-efficient portfolios primarily because they can use a greater number of funds to diversify their portfolios (although portfolios in plans with larger menus are still more efficient after controlling for the number of holdings).

The effect sizes noted in the analysis are large enough to have an economically significant impact on retirement outcomes. For example, default acceptance increases by approximately 0.7% for each additional fund that a plan adds to the core menu (moving from 10 to 30 funds). Default acceptance in the lowest group of plan menu sizes (10 funds) is 74% versus 87% for the largest group (30 funds). The effect remains after controlling for variables associated with default acceptance, including age, income, balance, and savings rate (which are all negatively associated with default acceptance). Increased default acceptance within plans that offer larger core menus is consistent with choice overload: participants in plans with smaller menus may feel more capable of building portfolios themselves, while participants in plans with more funds may feel overwhelmed and therefore remain in the default investment.

Additionally, self-directed participants in plans with more funds tend to have more-efficient portfolios mostly because they hold more funds. The average (median) number of holdings in portfolios increases from approximately 4.4 (4) among plans with about 10 funds, to 8.6 (7) for plans with around 30 funds. Risk-adjusted performance increases, on average, by 3.6 basis points for each fund included in the client portfolio. Therefore, increasing a fund menu from 10 funds to 30 funds, which would result in an average increase in holdings of approximately three funds per participant, would result in an estimated increase of alpha of 11 basis points for those participants self-directing their accounts. It is unclear whether improved efficiency is the result of access to a broader range of high-quality investment options or naïve diversification (Benartzi and Thaler, 2001) in which self-directed participants simply spread their portfolio among a larger number of funds.

We can extrapolate the expected efficiency benefits estimated for self-directed participants to the default investment-acceptance analysis and determine the aggregate (plan-level) increase in expected alpha for a plan moving from 10 to 30 funds in the core menu is approximately 10 basis points. While this may not seem material, it represents a relatively easy way for plan sponsors to improve likely retirement outcomes for participants. While there are additional administrative and monitoring costs that need to be considered when maintaining a larger core menu, those costs are likely significantly lower than the expected benefits.

Overall, large core menus appear to have the dual benefit of nudging more participants to use the default investment and then enabling self-directed participants to build more-efficient portfolios. When it comes to core menus, "bigger is better."

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The Rise of Defaults

The way a decision is framed, often referred to as choice architecture, can have a significant impact on individual decision-making across a variety of domains (Thaler and Sunstein, 2009). One domain that has increasingly seen a rise in the use of intelligent defaults is within U.S. DC plans. For example, the number of plans using automatic enrollment at Vanguard increased from 4% to 48% between 2004 and 2018. Plans using automatic enrollment now cover more than 60% of total participants (Vanguard 2019)[1]. These changes typically result in meaningful improvements in participant savings and investing behaviors (Choi, Laibson, Madrian, and Metrick, 2002).

The growing use of defaults requires plan sponsors and DC consultants to revisit the applicability of past research. Far more employers decreased the number of investments in their plan core menu in 2017 than increased (Callan, 2019. As a result of research documenting the underperformance of participants in larger plan menus (such as Iyengar, Huberman, and Jiang, 2004), plan sponsors have been encouraged to "simplify menus to meet participant objectives" to "reduce paralysis in decision-making" that leads participants to invest in inefficient defaults such as "100% in money market funds" (Capital Group, 2016). This conclusion, however, may be less relevant in a world of intelligent defaults.

If less financially sophisticated workers are better off accepting a professionally managed investment option such as the plan default investment, then plan sponsors should design menus to promote the use of default investments. Financial Engines and Aon (2016) find that participants who invested in a professionally managed investment solution—such as target-date funds or retirement managed accounts—experience median returns that are 3.32% higher than self-directed participants between 2006 and 2012. There is a relatively large body of research that suggests that most people are ineffective investors (for example, see Barber and Odean, 2001 among others); therefore, plan sponsors should design the core menu with an eye toward improving default usage.

Among the three qualified default investment options introduced by the PPA (balanced funds, managed accounts, and target-date funds), target-date funds have become the overwhelming plan sponsor favorite. These funds that provide diversification and a reasonable allocation of stocks and bonds, and whose costs have fallen as a result of fiduciary pressures on plan sponsors, are now used by 86% of DC plans that have a default investment (Callan 2019). Default acceptance is typically quite high among participants, and the continued promotion of defaults has led to a significant change in participant-investment behaviors in DC plans. Blanchett and Bruns (2019) find that approximately 80% of participants initially accept target-date funds when they are offered as the default. Eighty-four percent of participants are 100% invested in the default option after one year, 82% by two years, and 77% by three years, based on Vanguard-recordkept DC plans (Young and Young, 2018). While most participants invest in target-date funds, these funds only contain about

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1.   https://pressroom.vanguard.com/nonindexed/Research-How-America-Saves-2019-Report.pdf

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half the assets invested because older participants, and participants with higher balances, are more likely to self-direct (Blanchett and Bruns 2019).

There is limited research investigating the impact of core menu size on the likelihood that participants will select the plan default investment option. While there are intuitive quality implications (for example, a plan with a low-quality default investment and high-quality core menu funds is likely to have lower default acceptance than a plan with a high-quality default investment and low-quality core menu funds), the impact of menu size is less clear. In theory, a small-plan menu could result in higher default acceptance if participants aren't comfortable building diversified portfolios using the available core menu options. Alternatively, a large core menu could result in higher default acceptance if the greater number of options leads to choice overload, thereby dissuading the participant from self-directing.

Between 2006 and 2016, menu size has been relatively constant, controlling for target-date funds. Many target-date default series contain 10 or more retirement date years (vintages). As plans have added target-date funds, the total number of available investment options has increased, but the number of building-block investment options has remained constant. According to BrightScope and ICI (2019), the average total number of funds in 401(k) plans increased to 26 from 20 from 2006 to 2016; but after adjusting for target-date funds, the average number of funds has only increased to 20 from 18 funds. The distribution of the number of funds in 401(k) menus as of 2016, adjusting for target-date funds, was: 13, 19, and 30 funds at the 10th, 50th, and 90th percentiles, respectively, according to BrightScope and ICI (2019).

When faced with a slate of investment alternatives in a core menu, participants may adopt a strategy of spreading their savings across offerings. Benartzi and Thaler (2001) find that participants appear to divide their contributions evenly across the funds offered in the DC plan (which the authors call the *1/n heuristic*) in a manner that is inconsistent with diversification across asset classes. This subjects the participant to menu effects in which, for example, the equity among participants is influenced by the percentage of total equity funds the plan offers. Huberman and Jiang (2006) find that participants spread the bulk of their portfolio among a greater number of funds in plans with more available options but find little evidence that equity allocations are sensitive to the fraction of stock funds on the core menu. Morrin et al (2012) note that when the DC plan menu in the Oregon University System was expanded from 10 to 19 options on July 1, 2007, the percentage of participants electing the default increased from 21.2% to 33.5% and increased the number of funds held by self-directing participants (3.7 funds to 5.3 funds). The number of funds held by participants increases when core menus expand, and declines when funds are cut from the core menu (Keim and Mitchell (2018). Tang, Mitchell, Mottola, and Utkus (2010) find that the number of available funds in plans prior to the PPA was a less-important predictor of portfolio quality than the efficiency of investment offerings.

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Our dataset is significantly more robust than similar studies, with detailed participant-holdings data for approximately a half-million participants in more than 500 DC plans. The larger sample size allows us to explore this topic at considerable depth compared with the existing body of literature.

Data Set

To explore the relation between core menu sizes and participant-investment behaviors, we performed an analysis using data from a U.S.-based DC recordkeeper. The recordkeeper is not one of the 10 largest according to Cerulli's 2018 U.S. Defined Contribution Distribution Report. The recordkeeper's plans used in the analyses are not an exhaustive list. We also do not know how well these plans reflect the recordkeeper's entire book of business, although we do know that they are all 401(k) plans and therefore subject to Employee Retirement Income Security Act's, or ERISA, fiduciary standards.

The initial dataset (raw data) comprises 644,707 participant account allocations across 545 401(k) plans. All data is as of December 31, 2018. Several filters are applied to the raw data. To ensure we have timely demographic data available only participants coded as active are included. We also include filters for age, plan tenure, and salary. We also must be able to identify 100% of funds held in the respective portfolios. These initial filters reduce our base dataset to 439,859 participants. The actual test groups vary based on the respective test (for example, default acceptance versus participants self-directing their portfolios).

Since this analysis only includes participants who are actively participating in the DC plan to ensure timely income data, the population is going to be slightly different from the average DC participant. For example, in "How America Saves" report, Vanguard (2019) provides detailed information about its 1.5 million participants and $1.4 trillion in DC assets as of March 31, 2019. While the median age and income values in this dataset are roughly similar to the values noted by Vanguard (44 versus 45, and $70,000 versus $69,000, respectively), the median (average) plan balance of $44,152 ($127,687) for this dataset is higher than Vanguard's $22,217 ($92,148). This is likely because this dataset includes only active participants while Vanguard's data includes terminated participants. Overall, we feel this dataset is reasonably representative of today's 401(k) participants.

Exhibit 1 shows the distribution of the size of the core menus included in the analysis. The first column is the fund count for the menu, and the second column excludes target-date funds. As noted previously, it is common for certain target-date series to offer 10 or more unique target-date options (vintages). This can artificially inflate the respective size of the core menu, which is why a separate count of funds is included that excludes target-date funds from consideration. Note, some plans use a default investment option other than target-date funds (for example, a balance fund or managed accounts).

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Exhibit 1 Distribution of Size of Core Menus for Plans Considered

Percentile	All Funds	Excluding TDFs
2.5	13	11
5	14	12
10	16	13
25	20	15
Median	**25**	**18**
75	30	21
90	34	26
95	37	30
97.5	42	33
Average	**25**	**19**

The distribution of funds in the analysis is relatively similar to the distribution of core menus noted by BrightScope and ICI (2019) using 2016 Form 5500 data. Our distribution core menu size, excluding target-date funds, is 13, 18, and 26 at the 10th, median, and 90th percentiles, respectively, which is similar to the BrightScope and ICI (2019) values of 13, 19, and 30 funds at the 10th, 50th, and 90th percentiles, respectively.

There is no meaningful relation between the number of funds and plan size whether measured by total assets or total participants (based on the initial complete dataset that includes all active and terminated participants), consistent with the overall 401(k) landscape (according to BrightScope and ICI, 2019). The correlation between plan assets and number of core menu funds (excluding target-date funds) is 0.0162, and the correlation between total number of participants and the number of core menu funds is negative 0.0503. That the signs of the respective correlations differ by plan-size metric (positive for assets and negative for number of participants) is counterintuitive given the high correlation between those two metrics (0.7576).

The primary style metric used to classify funds for the analysis is Morningstar Category, as of December 31, 2018. Morningstar Category is a holding-based classification approach based on trailing three-year fund statistics.[2] In Exhibit 2 we aggregate the respective Morningstar Categories into broad style groups[3] and estimate the percentage of funds in the respective groups for 10 plan core menu size groups.

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2. See http://morningstardirect.morningstar.com/clientcomm/Morningstar_Categories_US_April_2016.pdf for additional information on the category approach.
3. https://admainnew.morningstar.com/webhelp/glossary_definitions/mutual_fund/mfglossary_broad_asset_class.htm

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Exhibit 2 Broad Style Coverage
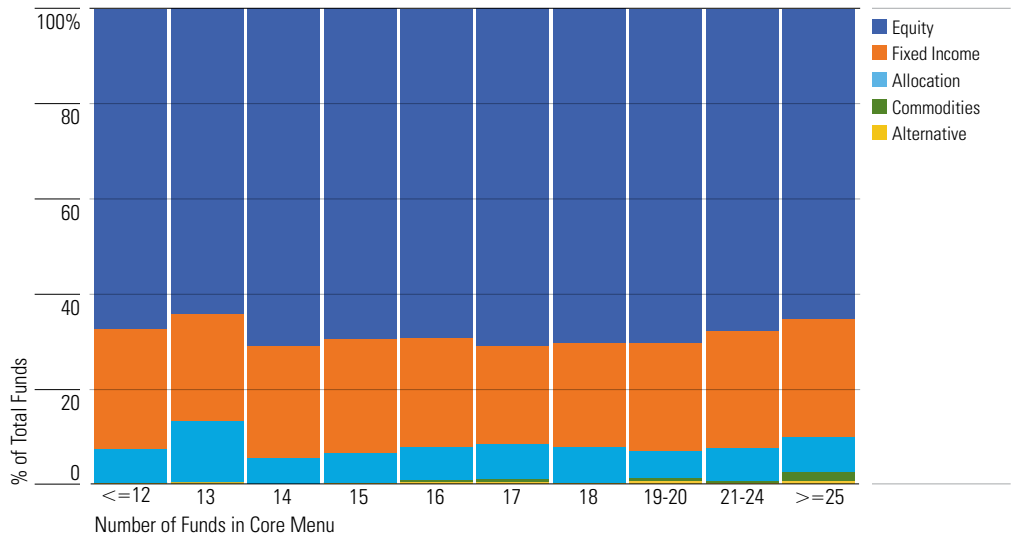
There is no significant change in the broad composition of funds across core menu sizes. For example, 68.6% of funds are equity funds, on average, and all groups in Exhibit 2 are within 4.3% of this value. Fixed-income options average 23.3% of available funds, and all plans are within 2.6% of this estimate. The relatively consistent nature of the broad style composition is important because offering more equity (bond) funds could encourage a participant to be more aggressive (conservative) portfolio.

While broad style exposures are relatively consistent across plan core menu-size sizes, not surprisingly, there are notable differences in the more precise investment styles available. The frequency with which core menus of different sizes have certain styles available is noted in Exhibit 3.

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Exhibit 3 Percentage of Plans with Respective Style Coverage by Plan Menu Size

Investment Style	<=12	13	14	15	16	17	18	19-20	21-24	>=25
	Number of Funds in Core Menu									
Short Government	0	6	3	2	4	0	3	5	7	24
Short-Term Bond	7	18	5	9	27	22	39	28	32	52
Multisector Bond	2	0	10	4	15	2	10	15	22	22
High Yield Bond	0	6	8	4	21	7	7	15	31	57
Inflation-Protected Bond	9	24	30	27	37	37	36	39	58	74
Intermediate Government	12	12	13	4	17	27	20	31	32	37
Intermediate-Term Bond	95	88	95	98	98	100	100	100	100	100
World Bond	7	3	10	9	8	12	10	23	38	49
Large Growth	60	76	90	93	92	98	95	93	100	100
Large Blend	95	94	100	100	98	100	100	100	100	100
Large Value	60	64	80	84	87	93	92	96	94	95
Mid-Cap Growth	21	30	45	53	42	59	73	81	92	83
Mid-Cap Blend	49	76	70	82	67	90	86	92	86	94
Mid-Cap Value	14	27	20	22	44	44	51	64	76	71
Small Growth	33	36	58	51	67	73	80	84	85	87
Small Blend	51	52	70	58	69	76	86	81	82	91
Small Value	40	39	43	53	69	63	68	76	79	81
Real Estate	35	30	33	33	58	66	46	53	58	70
Global Real Estate	0	0	5	4	2	7	5	5	8	26
Foreign Large Growth	51	45	75	53	46	49	49	55	60	70
Foreign Large Blend	56	70	60	87	81	88	83	86	90	91
Foreign Large Value	14	6	10	27	25	7	27	32	39	44
Foreign Small/Mid Blend	0	6	5	2	17	12	15	23	33	37
Diversified Emerging Markets	19	30	40	29	65	66	66	58	72	83

While most plans offer an intermediate-term bond fund and large-blend options (more than 95% of plans), other styles such as large growth, large value, small blend, and foreign large blend are also included in more than half of the plan menus in the smallest group (12 funds or less). It would be difficult for a plan with fewer investment options (for example, 10) to offer the breadth of coverage of a plan with many options (for example, 30). We see this effect since larger plans tend to offer diversifiers, such as inflation-protected bonds, world bonds, real estate, foreign small/mid-blend, and emerging markets.

One potential concern associated with offering a relatively large core menu is that it requires plan sponsors (or the respective fiduciary) to monitor more funds. Exhibit 4 provides some perspective as to how the "quality" of funds differ by core menu size. Metrics considered include Morningstar Rating™ for funds, Morningstar Analyst Rating™, historical Morningstar Category Return Ranking (1-year, 3-year, 5-year, and 10-year returns), and average expense ratio. All data was obtained

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from Morningstar Direct[SM] and is from December 31, 2018. For category rankings, one is best and 100 is the worst. We have included both the Morningstar Rating, also known as the "star rating," and Morningstar Analyst Rating because they have been noted to play an important role in fund selection, according to Del Guercio and Tkac (2008) and Armstrong, Genc, and Verbeck (2017), and are explained in Appendix 1.

Exhibit 4 Fund-Quality Metrics

| # of Core Menu Funds | Star Rating | Analyst Rating | Category Rank | | | | Expense Ratio |
			1-Year	3-Year	5-Year	10-Year	
<=12	3.66	4.03	38.34	35.52	30.91	35.10	0.42
13	3.68	4.05	37.67	34.70	29.01	35.13	0.35
14	3.71	4.00	41.54	35.83	30.99	33.31	0.47
15	3.70	4.13	40.49	35.73	30.75	32.17	0.42
16	3.70	3.90	38.99	36.81	30.36	32.52	0.36
17	3.70	3.91	39.30	36.44	30.49	31.34	0.36
18	3.74	3.98	40.12	35.90	29.56	30.84	0.39
19-20	3.72	3.93	39.37	36.76	30.16	31.76	0.38
21-24	3.76	3.86	39.61	35.91	29.58	31.00	0.43
>=25	3.63	3.69	41.72	38.37	33.48	33.69	0.46

There is no monotonic change in star ratings by plan core menu-size; however, Analyst Ratings decline for larger plans. It is not clear if this is an active decision of plan sponsors as they move away from core options (which are more commonly indexes) or simply a function of the plan sponsor being responsible for managing more funds. There is also no notable difference in historical fund returns (category ranks) and expense ratios by plan-size group among the plans being considered.

For the analysis we typically breakdown participants, based on number of funds in core menu, age, deferral rate, salary, and balance. The respective breakpoints for the groups are included in Exhibit 5.

Exhibit 5 Group Attribute Breakpoints

| Group#	Plan Funds	Age	Deferral Rate	Salary	Balance
1	<12	<30	<5%	<$50k	<$25k
2	12-14	30-39	5-7%	$50k-$75k	$25k-$100k
3	15-19	40-49	8-11%	$75k-$100k	$100k-$250k
4	20-24	50-59	12-14%	$100k-$150k	$250k-$500k
5	>=25	>=60	>=15%	>=$150k	>=$500k

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Default Acceptance

The best investment portfolio for most participants is likely going to be the one they effectively aren't managing—like where they have delegated management responsibilities to an investment professional, such as a target-date fund. Therefore, one potential objective of the core menu is to maximize the acceptance of the plan default investment or really any type of professionally managed portfolio. In theory, core menu size could affect default acceptance in different ways. For example, a small menu might nudge more participants to use the default since they would be less able to construct their own diversified portfolio. Alternatively, a larger menu might scare some participants away from building their own portfolio and result in them delegating the task to the available professionally managed option (for example, a target-date fund).

To determine the relation between core menu size and default acceptance, the initial dataset is filtered to isolate those participants (and plans) that have recently made a default election. Therefore, only participants who have a plan tenure of less than three years and a default election date on file are included in this analysis. Among these remaining participants, only those plans where at least 50% of the participants were using the default investment (a target-date fund) are included. Default acceptance is typically high (for example, 84% at Vanguard after one year according to Young and Young, 2018), and the plan-level filter ensures we are only considering plans with representative acceptance rates.

These filters result in a reduced dataset of 73,537 participants across 213 401(k) plans for this particular test. In addition to including participants who are noted as accepting the default (default investors), we also include participants who have more than 95% of their portfolio in some type of allocation fund (for example, a balanced fund or target-date fund). These participants would effectively be considered to have fully delegated portfolio-construction responsibilities, and while they might not be coded as being defaulted into the respective portfolio, the outcome is essentially the same (they have delegated responsibility of investment management).

We group participants in groups based on various attributes, including the number of funds in the core menu (excluding target-date funds), age, deferral rate, salary, and balance for comparison purposes as noted in Exhibit 5. The number of participants in each group are included in Appendix 2. The average default acceptance rate among all participants in this analysis was 80.6%.

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Exhibit 6 Default Acceptance by Attribute Group
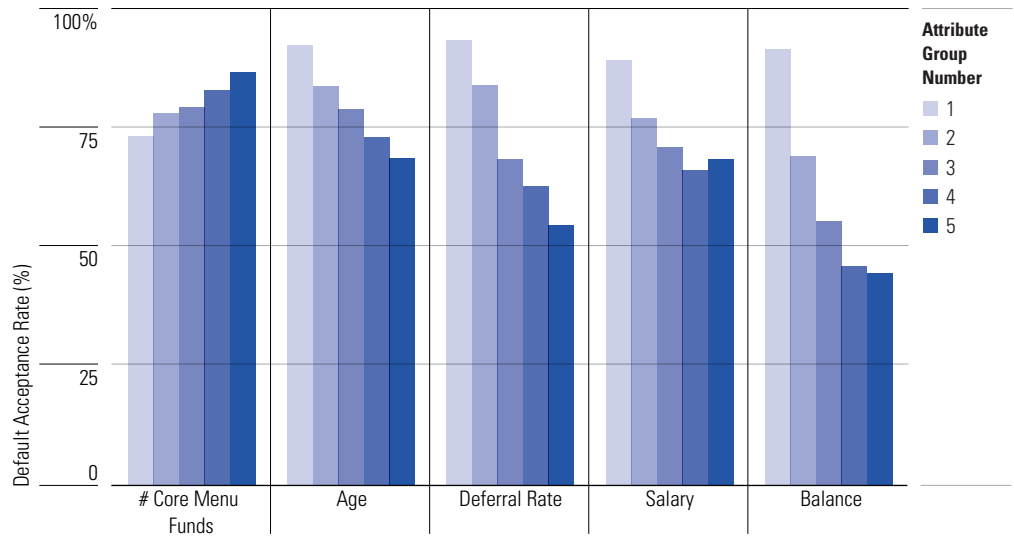
The demographic variables have a notable impact on default acceptance. For example, younger participants—with lower deferral rates, lower salaries, and lower balances—tend to have higher default acceptance rates. These relations are relatively monotonic and are obviously related (for example, higher deferral rates result in higher balances; people with higher salaries tend to be older, and so on). From a demographic variable perspective, we would likely describe those investors who are not using the default (self-directors) as being more sophisticated than those who are using the default investment. This has important potential implications for the next analysis, which focuses on the quality of the portfolios constructed.

Looking at how the number of funds is related to default acceptance, those plans with fewer funds in the core menu have significantly lower default acceptance rates than plans with more funds. Default acceptance for plans in the first group (about 10 funds) is 73.6% versus 87.1% for plans in the fifth group (about 30 funds). Ignoring other potential effects, this suggests default acceptance increases by approximately 0.7% for each additional fund included in the core menu.

Next, we run two sets of logistic regressions where default acceptance is the dependent variable, which is a binary variable and set to one if the participant has accepted the default, or else zero. The first model includes only the number of funds in the menu, and the second model also includes participant age, years the participant has been in the plan (plan tenure), years since the default election, total deferral rate, salary, balance, and gender, which is a dummy variable that equals one if the participant is a male. We run two sets of regressions to see how the coefficient for number-of-funds-in-the plan variable changes when other demographic variables are considered. The results of the logistic regressions are included in Exhibit 7.

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Exhibit 7 Logistic Regression Results

Coefficient	Model 1			Model 2		
	Value	Pr > Chi²	Odds ratio	Value	Pr > Chi²	Odds ratio
Intercept	0.752	< 0.0001		4.142	< 0.0001	—
# Plan Funds	0.038	< 0.0001	1.039	0.046	< 0.0001	1.047
Age	—	—	—	−0.010	< 0.0001	0.990
Plan Tenure	—	—	—	−0.019	< 0.0001	0.981
Deferral Rate	—	—	—	−0.011	< 0.0001	0.990
In (Salary)	—	—	—	0.139	< 0.0001	1.149
In (Balance)	—	—	—	−0.591	< 0.0001	0.554
Male	—	—	—	0.247	< 0.0001	1.280

The signs of the coefficients for the variables in Model 2 in Exhibit 7 are relatively consistent with the slopes for the demographic variables in Exhibit 6 (except for salary). The coefficient on number of funds in the menu is positive and statistically significant for both regressions. The magnitude of the effect actually rises after controlling for other demographic variables.

Overall, the results of this analysis strongly suggest that default acceptance is higher in plans with larger core menus. While we do not have concrete data on why default acceptance increases with the size of the menu, we believe it is at least partially attributable to choice overload. Larger plan menus may overwhelm a participant and thereby make selecting the default investment decision less mentally taxing. Again, higher default acceptance would generally be in the participant's best interest, given the relatively poor performance of participants who self-direct their portfolios.

Self-Directed Portfolio Analysis

While most participants select the default investment option when available, there are some who will still self-direct their accounts. For this group it is worth exploring the potential impact of core menu size on the quality of the respective portfolios. Past research has noted a positive relation between menu size and number of participant holdings (see Huberman and Jiang (2006) and Morrin et al (2012)), but this does not necessarily mean participants are building better portfolios, and past datasets have been relatively limited (it is not clear how robust the effects are). In this section we estimate the expected return and standard deviations for participant portfolios who are self-directing their accounts to determine whether portfolio efficiency differs across plan size.

For this dataset we only include participants who have less than 95% of the total balance in a target-date fund or the plan default. While we primarily focus on the balance allocations for this analysis (since it is how the account is invested), we also estimate statistics based on balances for robustness purposes. A total of 112,572 participants across 504 plans is available for this analysis.

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Self-directing participants have attributes that are different from the average 401(k) participant, as indicated by default investment-acceptance probability in Exhibit 6. For example, we would expect self-directing participants to be older, with higher deferral rates, salaries, and balances. Since these participants would generally be characterized as more sophisticated, we would expect these participants to have better portfolios than the average participant. This analysis allows us to test that hypothesis. Similar to the previous analysis, we group participants into groups based on attributes and we report the size of the respective groups in Appendix 3.

Each fund has a predetermined investment style (Morningstar Category). We map each of these styles to an index that we believe best reflects the investment exposures of that respective style. Note, we do not perform any type of further style analysis on the respective funds. Our approach implicitly assumes the participant is selecting a fund based on the fund's primary style exposure. While other attributes of the individual funds are likely to impact allocation decisions (for example, past performance), using a Morningstar Category-mapped index allows us to use general style weights of the fund without worrying about the unique tilts implicit within each portfolio manager's strategy.

The style-mapping approach is included in Appendix 4 for more traditional funds. For multi-asset funds (for example, target-date funds) we assume a relatively complex blend to various asset classes to reflect that these funds will likely be well-diversified. The overall weights for each category are based on the average equity allocation to all funds in that category as of December 31, 2018 and included in Appendix 5. The underlying style weights (e.g., to large cap growth, blend, value, etc) are based on the Morningstar Moderate Lifetime indexes and included in Appendix 6.

The style-mapping approach used for this analysis is superior to other approaches, especially those based on factor regressions, such as Calvet, Campbell, and Sodini (2007). The descriptive power of factor regression is going to be limited by the number of independent variables included in the regression. For example, Ayres and Curtis (2015) only include three factors to estimate fund risk exposures (i.e., betas) for each investment, which are domestic equity (proxied by the Russell 3000), fixed income (proxied by the Barclays US Aggregate Bond index), and international equity (proxied by MSCI EAFE International equity index). In our approach there are 80 different style-types represented by 52 different potential indices. This provides a robust framework to estimate portfolio efficiency. Additionally, using the Morningstar Category as the primary definition of style also matches how the risk of the fund is often presented to the participant (i.e., in enrollment materials and online).

The returns and standard deviations for each participant allocation estimated by multiplying the vector of estimated index weights by the assumed returns and standard deviations for the respective style groups, which are included in Appendix 4, as is the assumed equity allocation for the respective style. The returns and standard deviations are based on Morningstar Investment Management's 20-year capital market assumptions as of December 31, 2018. The correlation matrix is not included due to size considerations, but can be obtained by contacting the authors.

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The average equity allocation among all participants was 70.11%. In Exhibit 8 we include information about how the average re-centered equity allocation differs by attribute group (i.e., so that the average equity among all participant is zero). We re-center the allocations so the differences across attributes are more apparent.

Exhibit 8 Equity Allocation (Difference from Average) by Attribute Group


The most significant variable related to equity allocation in Exhibit 8 is age, where the equity allocations decrease by approximately by approximately 16% from the lowest group to the highest. Equity allocations also tend to rise by deferral rate, salary, and balance—attributes that would generally be associated with more-sophisticated investors. Equity allocations also tend to rise by the size of the core menu. This is an interesting effect, because core menus do not tend to favor equity funds over fixed-income funds as they increase in size (as noted in Exhibit 2) and suggests that while more of the funds available are not equity funds, participants still tend to use more equity funds in their portfolios. The fact participants in plans with larger core menus tend to invest more aggressively could be an additional potential benefit to the extent there is a positive equity risk premium in the future.

Next, we explore the differences in expected risk-adjusted returns (efficiency) for participant portfolios. Exhibit 9 includes the distribution of geometric returns where portfolios are combined in groups of 0.1% standard deviation increments for the fifth, 25th, 50th (median), 75th, and 95th percentiles. We include geometric return instead of arithmetic return, as it reflects the expected realized return that the participant would experience if investing over a longer time horizon (including the penalty associated with higher volatility). Again, the returns are based on the expected asset class/style return and are not based on the actual fund itself,

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so they would not include expense ratios, for example. We also include the assumed returns for the allocation-type funds (target-date funds) included in the analysis.

Exhibit 9 Distribution of Expected Return and Risk Values
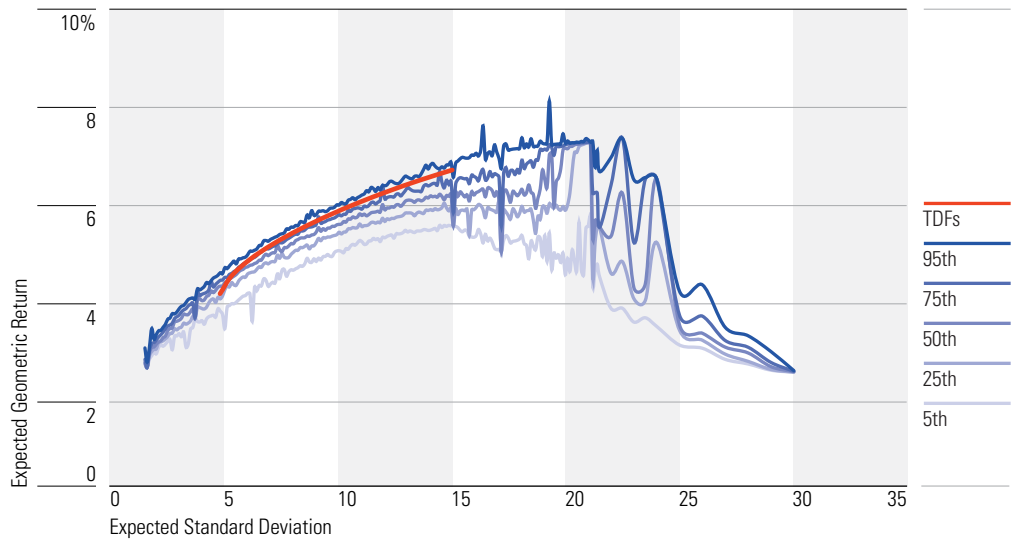
There is a considerable spread in the efficiency of participant portfolios. For standard deviations between 5% and 15%, which correspond to equity allocations of approximately 20% and 95%, respectively, the spread between the 5th and 95th percentiles is approximately 1.01%. This suggests that some participants build portfolios that are significantly better than others. The Allocation portfolios have expected geometric returns that are 54 basis points higher than the respective standard deviation group and more efficient than approximately 91% of respective participant portfolios. This speaks to the significant potential benefit associated with getting more participants in a professionally managed portfolio (for example, a target-date fund) compared with self-directing.

Since the expected return is going to differ by risk level (for example, participants who have portfolios with higher standard deviations have higher expected returns up to standard deviations of approximately 20%), we adjust for risk by subtracting the average geometric return for each expected standard-deviation increment level noted in Exhibit 8. We only include standard deviations up to 20%, because there are several portfolios past this point that have higher levels of risk and lower expected geometric returns (they are inefficient). Subtracting the risk-adjusted benchmark geometric return from the participant-portfolio expected geometric return results in an alpha metric for each portfolio. We next center the alphas so that the average alpha among all self-directed investors is zero. Again, though, this is still approximately 55 basis points below the expected returns of allocation funds. Exhibit 10 includes the risk-adjusted expected performance (alpha) for the various attribute groups.

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Exhibit 10 Who Builds More Efficient Portfolios? Average Expected Alpha by Attribute Group

Portfolio efficiency (expected risk-adjusted return) is highest for younger investors with higher deferral rates, higher salaries, and higher balances; however, the alphas are not all that economically significant (generally ranging between positive/negative 5 basis points). Since portfolio efficiency decreases by age but increases with other metrics that are generally associated with sophistication (for example, income and balance), it likely warrants additional analysis. There is a clear positive relation between the number of funds in the core menu and portfolio efficiency, primarily where participants in the fewest funds build the worst portfolios and participants in plans with the most funds build the best. The effects are relatively similar whether we use participant balances or investment election allocations.

Participants in plans with larger core menus tend to hold more funds in their portfolios. We demonstrate this effect in Exhibit 11, which includes distribution information of holdings by plan-menu-size group in Panel A and the estimated number of asset classes in the portfolio in Panel B. The participant is assumed to have an allocation to an asset class if the estimated weight to that asset class is 1% or higher. Allocation funds (for example, target-date funds) are assumed to have an exposure to 21 different asset classes as noted in Appendix 5, although we only include participants who have a maximum of 95% of the balance invested in allocation funds (they must be using some other fund from the core menu for at least 5% of the portfolio).

**Exhibit 11** Distribution of Holdings by Plan-Menu Size

Attribute Group Number	Number of Fund Holdings						Number of Portfolio Asset Classes					
	5th	25th	50th	Avg	75th	95th	5th	25th	50th	Avg	75th	95th
1	1	2	4	4.2	6	8	1	3	5	7.1	11	18
2	1	3	5	5.1	7	11	1	3	6	7.4	11	17
3	1	3	6	6.3	9	14	1	4	7	7.7	11	17
4	1	3	5	6.2	8	14	1	4	8	8	12	18
5	1	4	7	8.6	11	22	1	5	9	8.9	13	18

The number of funds in participant portfolios increases from 4.2 funds, on average, for plans in the group (about 10 funds) to 8.6 funds, on average, for plans in the fifth group (about 30 funds). The median number of funds increases from four funds to seven funds from the first to the fifth group, respectively. The average (median) number of asset classes increases from 7.1 (5.0) to 8.9 (9.0) for the first and fifth groups, respectively. There is a clear effect where participants in plans tend to hold more funds and asset classes, which suggests these participants are also likely to have more-diversified portfolios.

In Exhibit 12 we include the distribution of risk-adjusted expected relative performance (alphas) by the number of funds included in the participant portfolio in Panel A and the number of asset classes in Panel B. The benefits of more-diversified portfolios are apparent in both panels and the effect sizes are relatively similar. The primary reason for the similarities is that these participants are not widely using prepackaged (multi-asset) investment options, such as target-date funds. A target-date fund is a single fund that is highly diversified (it has allocations to a large number of asset classes), and these charts would look different if allocation funds were more widely used (for example, more single-fund portfolios would appear to be efficient).

The median alpha for a participant with a single holding (or asset class) is approximately negative 19 basis points, increasing to positive 15 basis points with 10 holdings. Diversification is often referred to as the only free lunch when it comes to investing, and that effect is being demonstrated here.

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Exhibit 12 Distribution of Portfolio Efficiency by Holdings

Panel A: Number of Fund Holdings   **Panel B:** Number of Portfolio Asset Classes
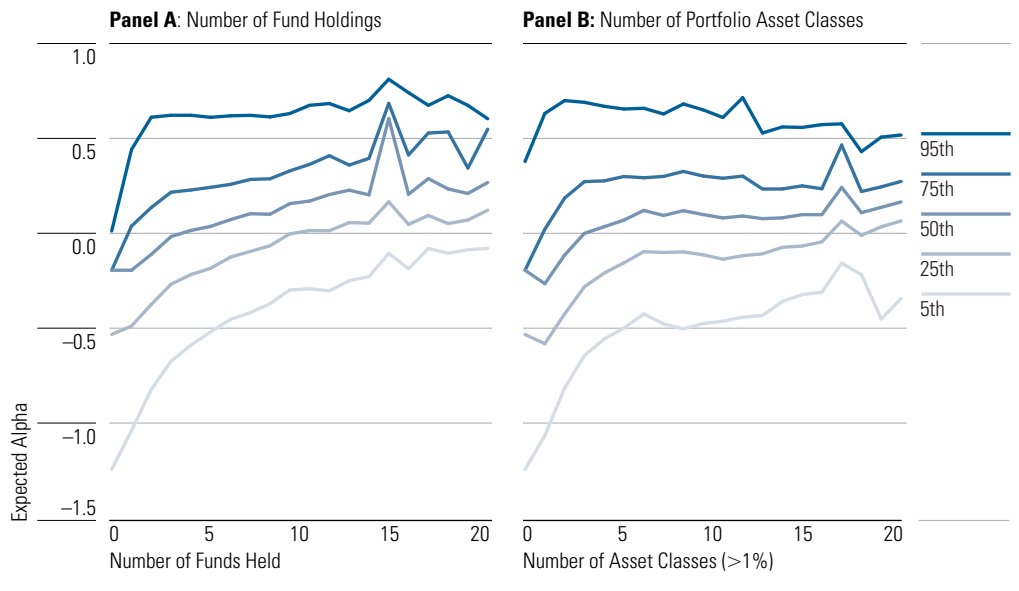
Core menu size has the largest effect on the number of categories in participant portfolios, as noted in Exhibit 13. The alphas noted in Exhibit 10 are strongly related to the number of categories in participant portfolios, as noted in Exhibit 13 (which is also consistent with Exhibit 12). Older participants with longer tenure, higher deferral rates, higher salaries, and higher balances tend to hold more categories.

Exhibit 13 Differences in Number of Categories in Participant Portfolios by Attribute Group

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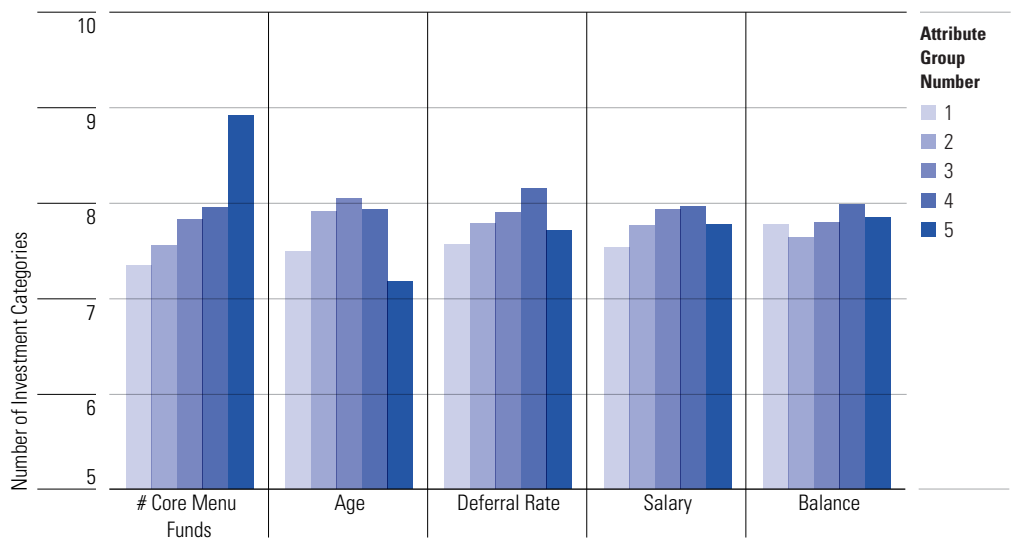
To better understand the potential drivers of portfolio efficiency, a series of ordinary least squared, or OLS, regressions are performed where the dependent variable is a normalized risk-adjusted return (where the average expected alpha is set to zero). The same demographic variables included in the previous logistic regression are also included in this regression, although we add the number of holdings in the participant portfolio as an additional independent variable. The results for three sets of OLS regressions are included in Exhibit 14.

Exhibit 14 OLS Regressions

	Model 1			Model 2			Model 3		
	Coeff	t Stat	p val	Coeff	t Stat	p val	Coeff	t Stat	p val
Intercept	-0.109	-26.468	0.000	-0.385	-17.953	0.000	-0.471	-23.294	0.000
# of Plan Funds	0.006	27.915	0.000	0.005	21.616	0.000	-0.001	-3.720	0.000
# of Participant Funds	—	—	—	—	—	—	0.036	118.297	0.000
Age	—	—	—	-0.003	-23.921	0.000	-0.002	-14.574	0.000
Tenure	—	—	—	-0.001	-6.088	0.000	-0.001	-4.949	0.000
Deferral Rate	—	—	—	0.000	1.078	0.281	0.000	4.864	0.000
ln(Salary)	—	—	—	0.033	14.786	0.000	0.040	19.225	0.000
ln(Balance)	—	—	—	0.008	6.529	0.000	-0.010	-8.073	0.000
Male?	—	—	—	-0.012	-4.401	0.000	-0.004	-1.594	0.111
R^2	0.69%			1.80%			12.65%		
Adjusted R^2	0.69%			1.79%			12.65%		
Observations	112,572			112,572			112,572		

Model 1 suggests each additional fund in the core menu adds 0.6 basis points of risk-adjusted alpha if the only independent variable in the regression is the number of funds in the core menu. The coefficient for core menu size decreases slightly (to 0.5 basis points) when participant demographic variables are included (model 2). The results in model 2 and model 3 suggest younger participants with lower tenures and higher salaries build more-efficient portfolios, consistent with the decline slopes in Exhibit 9. The coefficient for deferral rate is not statistically significant, and the sign of the coefficient for balance changes models.

Including the number of funds held by the participant (in model 3) increases the explanatory power of the regression, with the R^2 increasing from 1.80% in model 2 to 12.65% in model 3. It also results in a significant reduction in the number of plan-funds coefficient, from 5 basis points in model 2 to negative 0.1 basis points (effectively zero) in model 3. This again suggests that it is not that the plan has more funds, it is that participants in plans with more funds tend to hold more funds.

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Overall, these findings strongly suggest participants in plans with larger core menus build better portfolios. This effect is because participants in plans with larger core menus simply allocate to more funds than participants in plans with smaller menus.

Quantifying the Impact of Bigger Core Menus

We can use the results of this analysis to estimate the potential total plan benefits associated with a larger core menu. These benefits would be realized in two ways: first by a higher percentage of participants using the default investment option, and second by those participants who still decide to self-direct their portfolios by building more-efficient portfolios. For this analysis we contrast the potential benefits of moving from a core menu of 10 to 30 funds.

With respect to default acceptance, increasing the number of funds in the core menu from approximately 10 to 30 resulted in an increase in default acceptance from 73.6% to 87.1% (or 13.5%). The average risk-adjusted alpha for participant allocations is also approximately 54 basis points lower than the expected return of allocation-fund weights (the allocations are detailed in Appendix 5 and return differences are demonstrated in Exhibit 9). This estimated benefit of investing in the target-date fund is significantly lower than other estimates (for example, by Financial Engines and Aon, 2016), but it is a useful approximation. With respect to self-directors, the number of holdings among self-directed investors would be expected to increase by at least three funds, according to Exhibit 11, which resulted in an increase in expected alpha of 10.8 basis points.

Finally, if we assume the expected alpha for participants self-directing their accounts in the plan with 10 funds in the core menu, the total expected alpha for such a plan would be 39.7 basis points (54 basis points default investment alpha * 73.6% of participants in the default investment positive 0 basis points self-directed alpha * 26.4% of participants self-directing their accounts). For the plan with 30 funds, the total expected alpha would be 48.3 basis points (54 basis points default investment alpha * 87.1% of participants in the default investment positive 10 basis points self-directed alpha * 12.9% of participants self-directing their accounts). This represents a total expected increase in the risk-adjusted return for the plan with 30 funds in the core menu (versus 10) of approximately 10 basis points.

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Conclusions

Prior studies of defined contribution plan design provided evidence that increasing the number of available funds has a negative impact on the quality of participant-investment portfolios. These analyses were conducted in an era that precedes the widespread adoption of high-quality investment defaults and automatic enrollment. We find that increasing core menu size when employees are defaulted into high-quality, professionally managed portfolios can improve outcomes by inducing choice overload among participants who are better off in a default, while also improving the portfolio quality of self-directed participants.

Our findings suggest that plan advisors can feel more comfortable adding a broader range of investment options that sophisticated plan participants can use to build a customized portfolio. Participants defaulted into a target-date fund are each given the same asset allocation and the same portfolio. This means that the mix of assets is optimal for not one individual participant, even if a high-quality, professionally managed default is far more efficient than a participant's self-directed portfolio. While there are additional administrative and monitoring costs that need to be considered for larger plan menus, these findings strongly suggest that "bigger is better" when determining the number of funds to include in the core menu. A larger core menu appears to not only drive increased utilization of the default investment (which should be the primary objective) but also results in more-efficient portfolios for self-directing participants.

It is not clear to what extent these findings would persist across recordkeeping platforms (although they are generally consistent with existing research on this topic) to plan menus that are significantly larger (for example, can a menu be too big?), or to plans not covered by ERISA (which are not subject to the same fiduciary standards and may have significant disparities in quality). Regardless, this research suggests plan sponsors and DC consultants likely need to revisit their perspective of the role of the core menu and how it can be used to nudge participants toward better investment outcomes. M

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Appendixes

Appendix 1: Background on Morningstar Metrics

The Morningstar Rating for Funds™, also known as the "star rating," was introduced in 1985. It uses utility theory to provide a risk-adjusted assessment of a fund's historical performance. The star rating is purely quantitative and is not intended to convey the likelihood of future performance.

In contrast to the star rating, which is entirely quantitative and backward-looking, the Morningstar Analyst Rating™ is a forward-looking assessment of a fund's expected ability to outperform its peer group (or a relevant benchmark) over a market cycle, after accounting for risk and expenses. The Morningstar Analyst Rating is assigned by a Morningstar analyst and is therefore both qualitative and quantitative in nature. Morningstar launched its Analyst Ratings in 2011, and the rating is based on five "pillars," which are: Process, Performance, People, Parent, and Price. These pillars each seek to answer the following questions.

Process
What is the fund's strategy, and does management have a competitive advantage enabling it to execute the process well and consistently over time?

Performance
Is the fund's performance pattern logical given its process? Has the fund earned its keep with strong risk-adjusted returns over relevant time periods?

People
What is Morningstar's assessment of the manager's talent, tenure, and resources?

Parent
What priorities prevail at the firm? Stewardship or salesmanship?

Price
Is the fund a good value proposition compared with similar funds sold through similar channels?

For each pillar, an analyst assigns a rating of Positive, Neutral, or Negative. These pillar ratings are aggregated to an overall rating of Gold, Silver, Bronze, Neutral, or Negative.[4] The higher the rating (for example, Gold versus Silver versus Neutral), the higher the analyst's conviction in a fund's ability to outperform.

The actual Analyst Rating is used if it is available; if not, the Morningstar Quantitative Rating™ is used. Quantitative Ratings were developed using a machine-learning model designed to replicate the decision-making processes of its analysts.

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4. "Not Rated" is also a possibility if not enough information is available on the fund to assign it a rating.

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Appendix 2 Number of Participants by Group Number: Default Acceptance Test

Group	# Core Menu Funds	Age	Deferral Rate	Salary	Balance
1	2,973	14,625	26,349	36,236	46,793
2	11,722	19,231	23,999	15,178	15,123
3	35,381	16,307	10,487	8,602	6,662
4	15,368	15,195	3,902	7,785	2,986
5	8,092	8,178	8,799	5,735	1,972

Appendix 3 Number of Participants by Group Number: Self-Directed Test

Group	# Core Menu Funds	Age	Deferral Rate	Salary	Balance
1	24,406	7,019	12,797	18,980	34,576
2	27,984	22,347	26,933	21,129	18,376
3	34,709	30,478	28,203	18,642	27,134
4	11,593	33,613	11,464	25,278	17,881
5	13,880	19,115	33,175	28,543	14,605

Appendix 4 Style-Mapping Data

Mapped Category	Index Name (Direct)	Equity %	Expected Return %	Standard Deviation %
Money Market - Taxable	Morningstar Cash TR USD	0.00	2.70	1.73
Prime Money Market	Morningstar Cash TR USD	0.00	2.70	1.73
Ultrashort Bond	IA SBBI US 30 Day Tbill TR USD	0.00	2.70	1.73
Short Government	BBgBarc US Govt 1-3 Yr TR USD	0.00	3.32	2.00
Intermediate Government	BBgBarc US Government TR USD	0.00	3.46	5.16
World Bond	BBgBarc Gbl Agg Ex USD TR USD	0.00	3.48	10.58
Bank Loan	BBgBarc US Govt/Credit 1-3 Yr TR USD	0.00	3.50	2.00
Short-Term Bond	BBgBarc US Govt/Credit 1-3 Yr TR USD	0.00	3.50	2.00
Intermediate-Term Bond	BBgBarc US Govt/Credit Interm TR USD	0.00	3.76	3.87
Inflation-Protected Bond	BBgBarc Gbl Infl Linked US TIPS TR USD	0.00	3.82	6.38
Multisector Bond	BBgBarc US Agg Bond TR USD	0.00	3.89	5.07
Nontraditional Bond	BBgBarc US Agg Bond TR USD	0.00	3.89	5.07
Stable Value	n/a	0.00	3.89	1.73
Long Government	BBgBarc US Government Long TR USD	0.00	3.92	14.00
Market Neutral	Credit Suisse Equity Market Neutral USD	0.00	3.99	12.42
Long-Term Bond	BBgBarc US Govt/Credit Long TR USD	0.00	4.14	12.40
Corporate Bond	BBgBarc US Credit TR USD	0.00	4.33	6.94
Commodities Precious Metals	Morningstar Metals Commodity TR	0.00	4.85	13.67
Natural Resources	Morningstar Metals Commodity TR	0.00	4.85	13.67
Multialternative	Credit Suisse Multi-Strategy USD	0.00	5.30	5.55

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Appendix 4 Style-Mapping Data (Continued)

Mapped Category	Index Name (Direct)	Equity %	Expected Return %	Standard Deviation %
Multicurrency	Credit Suisse Multi-Strategy USD	0.00	5.30	5.55
High-Yield Bond	BBgBarc US Corporate High Yield TR USD	0.00	6.45	8.96
Managed Futures	BTOP50 Index	0.00	6.49	10.33
Long-Short Equity	Credit Suisse Long/Short Equity TR USD	0.00	6.51	10.08
Options-Based	Credit Suisse Long/Short Equity TR USD	0.00	6.51	10.08
Preferred Stock	BofAML Preferred Stock Fixed Rate TR USD	0.00	6.61	13.03
Emerging-Markets Bond	JPM EMBI Plus TR USD	0.00	7.03	13.39
Commodities Broad Basket	Bloomberg Commodity TR USD	100.00	4.55	17.38
Equity Precious Metals	S&P GSCI Gold Spot	100.00	5.50	21.69
Global Real Estate	FTSE EPRA/NAREIT Dvlp Ex US TR USD	100.00	6.40	14.55
Large Growth	Russell 1000 Growth TR USD	100.00	6.43	17.24
Large Blend	Russell 1000 TR USD	100.00	6.65	15.15
Company Stock	n/a	100.00	6.65	30.30
Utilities	S&P 500 Sec/Utilities TR USD	100.00	6.65	15.84
Large Value	Russell 1000 Value TR USD	100.00	7.10	14.75
Industrials	S&P 500 Sec/Industrials TR USD	100.00	7.14	19.34
Foreign Small/Mid-Blend	MSCI EAFE Small Cap GR USD	100.00	7.31	17.39
Foreign Small/Mid-Growth	MSCI EAFE Small Cap GR USD	100.00	7.31	17.39
Foreign Small/Mid-Value	MSCI EAFE Small Cap GR USD	100.00	7.31	17.39
World Small/Mid-Stock	MSCI EAFE Small Cap GR USD	100.00	7.31	17.39
Mid-Cap Blend	Russell Mid Cap TR USD	100.00	7.43	17.11
Mid-Cap Growth	Russell Mid Cap Growth TR USD	100.00	7.66	21.59
Technology	S&P 500 Sec/Information Technology TRUSD	100.00	7.67	22.93
Mid-Cap Value	Russell Mid Cap Value TR USD	100.00	7.67	16.24
World Large Stock	MSCI ACWI GR USD	100.00	7.72	14.52
Health	S&P 500 Sec/Health Care TR USD	100.00	7.75	15.30
Foreign Large Growth	MSCI EAFE Growth GR USD	100.00	7.82	16.62
Pacific/Asia ex-Japan Stk	MSCI Pacific Ex Japan GR USD	100.00	8.01	18.81
Real Estate	FTSE NAREIT All Equity REITs TR USD	100.00	8.08	19.31
Energy Limited Partnership	S&P 500 Sec/Energy TR USD	100.00	8.28	21.76
Equity Energy	S&P 500 Sec/Energy TR USD	100.00	8.28	21.76
Diversified Pacific/Asia	MSCI Pacific GR USD	100.00	8.74	17.41
Foreign Large Blend	MSCI EAFE GR USD	100.00	8.85	16.41
Small Growth	Russell 2000 Growth TR USD	100.00	9.12	24.12
Financial	S&P 500 Sec/Financials TR USD	100.00	9.28	22.06
Small Blend	Russell 2000 TR USD	100.00	9.29	21.15
Europe Stock	MSCI Europe GR USD	100.00	9.30	18.36
Diversified Emerging Mkts	MSCI EM GR USD	100.00	9.64	22.63
Japan Stock	MSCI Japan GR USD	100.00	9.69	20.31
Foreign Large Value	MSCI EAFE Value GR USD	100.00	9.78	16.99
Small Value	Russell 2000 Value TR USD	100.00	9.81	19.37

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Appendix 5 Allocation Funds, Equity Weights

Allocation Fund Group	Equity %
Allocation—15% to 30% Equity	25.00
Allocation—30% to 50% Equity	40.00
Allocation—50% to 70% Equity	60.00
Allocation—70% to 85% Equity	80.00
Allocation—85%+ Equity	95.00
Target-Date 2000-2010	55.67
Target-Date 2015	36.30
Target-Date 2020	42.23
Target-Date 2025	42.70
Target-Date 2030	55.66
Target-Date 2035	67.36
Target-Date 2040	77.20
Target-Date 2045	84.21
Target-Date 2050	90.20
Target-Date 2055	90.61
Target-Date 2060+	90.85
Target-Date Retirement	89.67
World Allocation	32.07
Tactical Allocation	44.70

Appendix 6 Allocation Funds, Equity and Fixed Income Style Weights

Index	Fixed Weight %	Equity Weight %
IA SBBI US 30 Day Tbill TR USD	10	0
BBgBarc US Govt/Credit 1-3 Yr TR USD	15	0
BBgBarc US Govt/Credit Interm TR USD	30	0
BBgBarc US Govt/Credit Long TR USD	15	0
BBgBarc Gbl Infl Linked US TIPS TR USD	10	0
BBgBarc US Corporate High Yield TR USD	10	0
BBgBarc Gbl Agg Ex USD TR USD	10	0
Russell 1000 Growth TR USD	0	15
Russell 1000 TR USD	0	17
Russell 1000 Value TR USD	0	15
Russell Mid Cap Growth TR USD	0	4
Russell Mid Cap TR USD	0	4
Russell Mid Cap Value TR USD	0	4
Russell 2000 Growth TR USD	0	2
Russell 2000 TR USD	0	2
Russell 2000 Value TR USD	0	2
FTSE NAREIT All Equity REITs TR USD	0	5
MSCI EAFE GR USD	0	10
MSCI EAFE Growth GR USD	0	5
MSCI EAFE Value GR USD	0	5
MSCI EM GR USD	0	10
Total	**100**	**100**

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