Spending Policy Customization for Institutional Preferences

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Many research papers have demonstrated, through historical analysis and simulation, the various shortcomings of popular spending rule methodologies, specifically the tendency to lose purchasing power over time. This paper identifies negative correlation between portfolio purchasing power and realized distribution rates as the primary cause of these shortcomings and the source of considerable fiduciary risk.

Using this research I outline a new spending rule, the Purchasing Power rule, which is designed to sustain portfolio values in a more reliable manner. This paper presents a framework for using this research to develop customizable spending rules based on organizational preferences and goals.

In 1969, the Ford Foundation published two groundbreaking reports calling for change in the institutional investment management industry [1]. These reports highlighted the negative consequences of conservative industry regulations on endowed portfolios, which dictated that spending should be restricted to interest and dividends received. These reports called for a change in approach, advocating for a 'total return' method of investing. This approach, they argued, would allow for greater growth and distributions for beneficiaries over time. Just three years later, the Uniform Management of Institutional Funds Act was passed, allowing for this new method of management.

While this change to a more effective method of portfolio management was an opportunity for the industry, it also created a spending challenge. The previous method of distributing annual income was straightforward, but distributing funds from a portfolio that will fluctuate up and down posed a more difficult task. In 1969 the Ford Foundation implemented a method of spending which is now known as the Moving Average rule, in which a fixed spending rate is applied to the three year average portfolio value. Litvack, Malkiel and Quandt (1974) formalized the development of such a policy.

(1) "The Law and Lore of Endowment Funds" by William Cary and Craig Bright and "Managing Educational Endowments" by Robert Baker

Since this time, this method of distributing funds has steadily gained popularity. In the 1993 NACUBO Endowment Study, 55.9% of surveyed institutions reported utilizing this method. By the 2015 edition of the NACUBO-Commonfund Study of Endowments, the adoption rate was up to 77.0%.

As the Moving Average rule grew in popularity, so too did the volume of research which highlighted the various weaknesses of such a spending policy. Nettleton (1987) quantified the risk of overspending through a simulation analysis, and called on practitioners to ensure that spending rates are conservative enough to allow for preservation of purchasing power. Garland (1989) demonstrated that use of this spending rule would have historically lead to large swings in purchasing power, up and down, as returns fluctuated. Sedlacek and Clark (2003) highlighted the negative impact of basing spending on a three or five year track record of portfolio values, as this inherently leads to significant overspending during stock market corrections. De Santis (2014) demonstrated that even under ideal conditions, where practitioners correctly align spending rates with future real returns, this method of spending is likely to produce a significant loss of purchasing power over a 50 year period.

This paper will add to this volume of work by dissecting the mechanical flaw that leads to each of these issues previously highlighted in the existing literature. Specifically, I will show that the nature in which the Moving Average rule (along with other popular methods) distribute capital is counterintuitive to the goal of maintaining purchasing power. Using this insight, I will propose a more intuitive

method of distributing funds for institutions which prioritize this goal. I will highlight the pros and cons of this method, and compare its performance in both real historical periods as well as through simulation against popular methods. Finally, I will show how this new research can be used to develop customized spending rules based on institutional preferences and goals, and how this process produces more attractive outcomes than existing popular methods.

Dissecting Mechanical Issues

To understand why the Moving Average rule is ineffective at maintaining purchasing power over time, it is necessary to look at the mechanics of how this rule operates and responds to market volatility. This can be done through a simple example given the following information:

PV_{T-3} = $100

PV_{T-2} = $110

PV_{T-1} = $90

Spending Rate = 5%

The Moving Average rule would calculate spending, using these variables, to be $5.00. Using the most recent portfolio value of $90, this is a realized spending

rate of 5.56%. Even though the portfolio value has fallen, the realized spending rate is higher than the designated 5.00% spending rate.

If we calculate the same example, with PVT-1 equaling $80, rather than $90, the Moving Average rule reduces spending to $4.83, but the realized spending rate rises to 6.04%. The larger the decline in the most recent year, the greater the realized spending rate will be.

Intuitively, we know that if the goal of a spending rule is to maintain purchasing power over time, it is illogical to increase the realized spending rate during periods where portfolio values are falling. This only serves to promote further decline. As a result, this mechanical flaw in the Moving Average rule promotes portfolio deviation over time, and makes portfolios more susceptible to sequence of returns risk. Strong positive returns will be met with under-spending, promoting real appreciation. Strong negative returns will be met with overspending, promoting real depreciation. This phenomenon will be discussed further in the section 'Stress Test & Fiduciary Risk'.

Looking at historical market performance, this concept can be demonstrated by assessing how a hypothetical portfolio would have performed over the 20 years ending 2017. This analysis is conducted using a simple $1.00 portfolio consisting of 60% equities and 40% bonds, with the S&P 500 TR Index and five year Treasury bonds representing each asset class. The Consumer Price Index was utilized as a measure of inflation. The Moving Average rule is a simple algebraic equation, and so we are able to model the performance over time

without human intervention. Each year distributions are determined by the spending rule, and the remainder of the portfolio grows along with our model 60/40 portfolio.

The only required input for this analysis is the designated long-term spending rate. Using hindsight, we know that this 60/40 portfolio produced a 6.95% annualized rate of return over this time period, and that inflation averaged 2.15%, so real growth averaged 4.80% per year. While practitioners were unlikely to have precisely forecast this return and inflation performance, I will utilize 4.80% as the spending rule to show how these rules perform in absence of human error.

Figure A. displays the performance of the Moving Average rule over this 20 year period. The green line is associated with the left axis, and displays the growth of the portfolio in real terms over this 20 year period. The tan line is associated with the right axis, and displays the realized spending rate in each year. The realized spending rate is simply the distribution value divided by the portfolio value.

Figure A. shows that the real portfolio value rose initially, during the final years of the bull market in the late 90s, then declines during the recession in the early 2000s and again in the 2008 financial crisis, ending the 20 year period with just $0.88 of initial purchasing power. Despite the portfolio value losing purchasing power, the Moving Average rule spends above the designated 4.8% in 14 of the final 18 years. In addition, as outlined by Sedlacek and Clark (2003), spending

spikes to its highest levels during periods of poor market performance. This is naturally counterintuitive, if the goal is to maintain purchasing power over time. Spending more than the intended long-term spending rate only serves to further reduce the portfolios purchasing power.

This relationship was highlighted by Kaufman and Woglom (2005), in their analysis of institutional spending starting in the late 1990's and ending in 2003. They noted that "although the changes in the average spending rates were not great, they tended to exacerbate the effects of negative rates of return".

Figure B. displays the same analysis using the Hybrid, Bands and Simple spending rules (defined in **Figure C**). Collectively, along with the Moving Average rule, 97.7% of institutions reported using one of these spending rules in the 2015 NACUBO-Commonfund Study of Endowments, and so including these rules into this analysis allows for a fairly comprehensive analysis of current spending practices. As Figure B. shows, all of these spending rules allowed for the loss of purchasing power over this time period. Each portfolio ends with values ranging between $0.86 and $0.91, representing a loss of purchasing power between 9-14%.

If we run an identical analysis, starting in 1928 when our dataset begins, we see a steady loss of purchasing power over this 90 year period. The only difference between this analysis and the prior 20 year study is a revised spending rate of 6.0%, to reflect the average portfolio return of 9.1% and the average inflation rate of 3.1%. Looking at **Figure D.**, we see that at the end of this 90 year period, each

of these four portfolios have lost between 53% and 73% of initial purchasing power. As Garland (1989) found, purchasing power of portfolios swing dramatically over time as market returns fluctuate.

If we measure the relationship between the change in real portfolio value from year to year against the change in realized spending rates from year to year, we see that a strong negative correlation exists between these two variables for popular spending methods **(Figure E).** This negative correlation simply quantifies the relationship between these variables as we saw in Figures A and B. As purchasing power rises, these rules reduce distribution rates. As purchasing power falls, these rules increase distribution rates. The Simple rule, by its very nature, shows no correlation as the distribution rate remains constant at all times.

These negative correlations exist, intentionally, to reduce the volatility of cash flows from one year to the next. Increasing spending rates when markets decline is a necessary evil if an institution requires steady cash flows from one year to the next, however this cash flow stability has negative long term consequences, as demonstrated in these historical analysis. Organizations with greater flexibility in annual cash flows, and those that prioritize the long term preservation of purchasing power, should rightly view these negative correlations as a hindrance to the long-term health of their portfolio.

The Purchasing Power Rule

For institutions which prioritize the long-term preservation of purchasing power, a preferable spending rule will distribute capital in a more intuitive manner. This means using a rule which recognizes whether the portfolio has gained or lost purchasing power, and adjusts spending in a way that promotes the preservation of purchasing power. With an understanding that the relationship between spending and portfolio volatility drives long term preservation of purchasing power, I have designed a new spending rule which maintains a strong positive correlation.

The spending rule, shown below, calculates spending by initially multiplying the portfolio value by the desired long-term spending rate. This first piece is identical to the Simple rule. Then that value is multiplied by an adjusting factor, which divides the current market value of the portfolio by the purchasing power that the portfolio should have. This desired purchasing power value is calculated by adjusting prior contributions for inflation and accounting for any new donations over the previous year.

$$\text{Annual Spending} = (M \cdot S) \cdot \left[\frac{M}{((P_{T-1} \cdot (1+i)) + D)} \right]$$

Where:

M = Market value of portfolio

S = Spending rate

P_{T-1} = Cumulative inflation adjusted value of principal and donations as of one year ago

i = inflation over previous year

D = New donations to portfolio over previous year

This adjustment factor allows spending rates to fluctuate in accordance with portfolio volatility. If the portfolio value has appreciated by 20%, the spending rate will be 20% higher. If the portfolio has lost 20% purchasing power, the realized spending rate declines by 20%. In this way, the annual spending reflects the current status of the portfolio, and acts in a way which promotes mean reversion to purchasing power over time.

This reactive manner of spending is highly volatile however, causing annual distributions to fluctuate with the portfolio. As I will show in the section "Creating Balanced Outcomes", this volatile manner of spending becomes crucial to the development of customized spending rules that achieve more optimal and balanced outcomes.

Returning to the initial historical analysis covering the 20 years ending in 2017, **Figure F.** displays the performance of the Purchasing Power rule over this time period. Here we can visualize the connection between real portfolio value and the spending rule's decision on how much to distribute in each year. Having that connectivity allows the portfolio to retain 99% of its purchasing power over this time period.

Expanding to the 90 year analysis, **Figure G.** now includes the Purchasing Power rule. Here we see that while popular methods have lost over half their purchasing power, the Purchasing Power rule has retained 93% of its value.

Lastly, **Figure H.** displays the strong positive correlation between the movement of the portfolio and the distributions determined by the Purchasing Power rule.

Simulation

To analyze how each rule performs in a variety of market scenarios, I've performed the same analysis using simulated 100 year periods. These periods were compiled using annual randomized returns which were generated independently and accumulated in lognormal form. The return and volatility inputs were set to match the long-term historical data from 1928-2017. The average annual return was set at 9.1%, with 3.1% as the average inflation rate, implying real growth of 6.0% per year on average. The spending rate was set

equal to the real portfolio return of 6.0%. I also used the historical annual standard deviation of 11.6% for this 60/40 portfolio.

Figure I. displays summary results of this simulation, and on the first line the median ending real portfolio value of the 10,000 simulations is shown, using a $1 starting portfolio value. Here we see that popular spending methods retain between 29-52% of purchasing power, on average, at the end of the simulation. The Purchasing Power rule retains 86% of initial purchasing power. These findings confirm the results shown in the historical 1928-2017 analysis. Popular methods lose the majority of their purchasing power over this time period while the Purchasing Power rule retains significantly more value.

This median outcome hides a significant difference in outcomes however. **Figure J.** displays the median outcomes shown in Figure I, but also includes the 10th and 90th percentile outcomes as well. The popular spending methods, on average, lose significant purchasing power, but they also have wide ranges of potential outcomes based on the sequence in which they experience returns. The Moving Average rule, for example, has a 10th percentile outcome of just $0.09 and a 90th percentile outcome of $2.37. The Purchasing Power rule not only retains more purchasing power on average, but also is able to produce more consistent results, even when extreme scenarios are modeled.

It's worth noting that while the Purchasing Power rule retains far more value, it still loses some real value, on average, over this time period. This tendency to partially lose purchasing power derives from the difficulty of attempting to spend

all real earnings while experiencing volatility. This is a concept addressed by Coiner (1990), who demonstrated that the more volatility in returns, the more difficult it becomes to retain purchasing power while attempting to spend all real earnings. This dynamic is shown in **Figure K.** which displays the results of the base simulation using a variety of asset allocations, where spending rates were again set equal to the real return achieved. As portfolios experience higher levels of volatility, there is a greater loss in purchasing power across all spending methods. Of course, this also further demonstrates the consistency of the Purchasing Power rule, as outcomes are far more similar across all four modeled asset allocations compared to popular methods.

This simulation allows us to also highlight an important negative consequence from using the Purchasing Power rule, which is that there is higher cash flow volatility. Since the Purchasing Power rule makes no attempt to smooth distributions, and instead focuses on the retention of purchasing power, we see higher levels of cash flow volatility. Figure I. displays the frequency of years in which distributions decline, as well as the average decline. These results show that the Purchasing Power rule has more years in which distributions decline, and when those declines occur, this rule has a much larger average reduction in distributions. This volatility makes the Purchasing Power rule largely unusable in isolation. Only institutions with the greatest of flexibility could implement such a rule and withstand the changes in annual distributions. Fortunately, as described later in this paper, this volatility can be mitigated through the

construction of spending rule 'portfolios' designed to meet the specific needs of each institution and produce more balanced outcomes.

Figure L. plots the first and last lines of Figure I., to demonstrate the inherent tradeoff between a spending rules ability to maintain purchasing power and its ability to produce steady distributions. The Purchasing Power rule is at one extreme, allowing for the majority of purchasing power to be retained over time, but subjecting an organization to frequent large distribution declines. The Hybrid rule is the other extreme, providing more stable distributions but retaining less than 30% of purchasing power over time.

Stress Test & Fiduciary Risk

The purpose of the original simulation is to demonstrate how portfolios perform in absence of human error. That is, the average real return achieved aligned with the spending rate that was used. In this initial analysis, historical performance numbers were used, however industry expectations are for much lower real returns in the near future, suggesting that institutions must reduce spending rates accordingly. In Vanguard's 2018 Market and Economic Overview, ten year projections for a similar stock and bond mix are 4.5% and inflation expectations are 2.0%, suggesting a 2.5% real rate of return. J.P. Morgan predicts 5.25% returns and 2.25% inflation over the next 10-15 years in

its 2018 Long-Term Capital Market Assumptions report, suggesting a 3.00% real rate of return.

If practitioners correctly forecast future returns, and adjust spending rates accordingly, then they can expect similar outcomes to what the original simulation presented in Figure I. A lower return environment won't drive greater loss of purchasing power, so long as the spending rate is adjusted accordingly. However, a misalignment of return forecasts and spending rates will have a significant negative effect on institutions using popular spending rules, and so it's important for practitioners to understand the impact of even a short period of overspending.

To demonstrate this point, I return to the initial simulation but modify the returns to reflect a period of below-average returns for the first decade. I held the spending rate constant at 6.0% to simulate the effect of overspending in the first 10 years. **Figure M.** displays the median real portfolio values, over 10,000 simulations, for each spending rule under four scenarios. The first scenario simply provides summary data from the original simulation for comparison purposes. The second scenario models an initial 10 year period where market performance is modeled to be 1% lower each year than expected. Scenarios three and four model for an annual 2% and 3% underperformance respectively.

These figures show the percentage of purchasing power retained at year 10, 30 and 100. There are several key takeaways from these simulations. First, as we would expect, poor market performance has a negative impact on the portfolios

ability to maintain purchasing power. As the level of underperformance is increased, the retention of purchasing power declines steadily. Under the worst scenario, roughly 1/3 of portfolio purchasing power is lost over the first 10 years.

Second, popular spending rules allow this initial period of underperformance to continue to affect outcomes well beyond the decade of underperformance. In years 30 and 100 we see lower real portfolio values than in the base simulation. This aligns with Nettleton's (1987) findings on the risk of overspending using popular methods. The Purchasing Power rule, however, resists and corrects for this period of underperformance. Even in the worst scenario, the Purchasing Power rule is able to correct for this period of underperformance and produce outcomes which are similar to the base simulation in year 30 and 100.

This corrective action by the Purchasing Power rule is a valuable tool for trustees. Whereas popular spending rules magnify any error between the utilized spending rate and subsequent real portfolio return, the Purchasing Power rule actively works to take corrective action. When we think about the fiduciary responsibilities of trustees, and the decision making process of selecting a spending rule, these popular methods should be understood to contain significant fiduciary risk. Any error in setting spending policy using popular methods can permanently impact the organization in a negative manner. The Purchasing Power rule, on the other hand, supports trustees and works as a tool to ensure proper management. The use of the Purchasing Power rule, by taking proactive corrective measures, greatly reduces the fiduciary risk for trustees.

It should be noted that from a practical standpoint, every institution will operate under unique circumstances, and some may be restricted due to budgetary issues from modifying distributions as low as recommended by the Purchasing Power rule during a period of poor performance. While the reality is that no institution can sustainably spend at a rate above the real return achieved by their portfolio, the Purchasing Power rule offers some hope to these less flexible institutions by preventing a subsequent rise in spending rates while the portfolio is underwater. Popular methods, which depending on the methodology only take into account the most recent 1, 3 or 5 years of portfolio performance, can quickly reset and begin increasing distributions even when the portfolio is significantly underwater. The Purchasing Power rule takes into account the entire history of the portfolio, and recommends the proper spending amount based on that large breadth of information. So, while budgetary constraints may hamper the Purchasing Power rules ability to react in strong market downturns, it's still capable of educating and providing restraint during the subsequent market recovery.

Creating Balanced Outcomes

In 1952 Markowitz published 'Portfolio Theory', a paper describing the benefits of combining non-correlated asset classes into portfolios, which produce more effective investment outcomes. When constructed properly, portfolios can expect higher returns, lower volatility, or both. We can use the same logic to construct 'portfolios' of spending rules. (2)

Returning to Figure H, we know that the most negatively correlated popular spending rule is the Hybrid rule, while the most positively correlated spending rule is the Purchasing Power rule. Using each rule to calculate annual spending, and then weighting those results in varying proportions, allows for more balanced outcomes to be achieved, as shown in **Figure N**. The five additional rules shown are displaying the results of several of these spending rule 'portfolios'. The naming convention of these rules is indicating the proportion of Purchasing Power rule, i.e. for the 5% Blend outcome, distributions were a product of 95% Hybrid rule and 5% Purchasing Power rule. There are, theoretically, an unlimited number of possible pairings between these two rules, and therefore there are many additional possibilities beyond the five outcomes displayed.

(2) Markowitz's research is referenced here as it pertains to the benefits of combining non-correlated components into one portfolio. I have no reason to believe that the portfolios constructed here form an efficient frontier, such as the one discussed in Markowitz's research. It is entirely possible that more efficient outcomes can be achieved through the combination of other spending rules.

There are several important takeaways from the outcomes displayed in Figure N. First, there are significant benefits for using a blended method than either the Hybrid or Purchasing Power rule in isolation. Moving from the Hybrid rule to the 5% Blend or 10% Blend introduces very little additional cash flow volatility, but greatly improves the purchasing power retained. Likewise, moving from the Purchasing Power rule to the 60% Blend or 40% Blend methods allows for a similar level of purchasing power to be retained, while significantly reducing cash flow volatility.

A second takeaway is that the outcomes produced by the 10% Blend and 20% Blend methods present improvements to both cash flow volatility and retention of purchasing power, when compared to the Moving Average, Simple and Bands methods. Practitioners employing one of these rules can improve both characteristics of their spending policy by moving towards one of these more balanced methods.

As an added benefit, these methods retain the ability to reduce fiduciary risk related to a misalignment of realized returns and the designated spending rate. **Figure O.** displays the result of the stress test scenarios, this time including the 10% Blend and 20% Blend methods. Just as the Purchasing Power rule resists and corrects for the damage done by a period of underperformance, so too do these methods, producing similar outcomes by year 100 under all four scenarios. Since it's highly unlikely that practitioners will correctly align spending rates

today with future real returns, this ability to overcome periods of overspending is extremely valuable.

Considerations for Spending Policy Design

Navigating the tradeoff between cash flow stability and long term preservation of purchasing power can be difficult for practitioners. As this paper has shown, there are significant benefits to using a blended method, rather than any of the four popular rules or the Purchasing Power rule in isolation. There are several considerations for practitioners attempting to find an ideal blended rule.

First, practitioners should attempt to understand the level of spending decline that their institution can reasonably withstand. An analysis of fixed and variable costs within an organization can help practitioners understand the pain inflicted on the organization at various magnitudes of spending declines. Institutions with high levels of predetermined spending responsibilities will have less tolerance for declines than institutions with a high level of discretionary annual spending. As a result, the lower the tolerance for spending declines, the greater the appropriate weighting of the Hybrid rule in the blended spending rule will be.

Secondly, the institution must consider their responsibility and commitment to donors who entrusted their institution to manage assets in a sustainable

manner. There will always be a preference from operating staff for greater stability in annual distributions, as this naturally makes the budgeting and planning process easier and more efficient. Trustees must balance that preference with the understanding that there is a cost associated with that short-term stability, and that donors voices should play a role in this decision as well.

Third, institutions may want to consider whether the presence and nature of additional revenue sources alter the desired distribution experience. This third consideration, however, is the subject of much debate.

Many authors, such as Black (1976), Hansmann (1990) and Merton (1992) make the argument that endowed portfolios are merely a part of the larger institution, and therefore management of the portfolio should take the institutions finances into account and provide cushion against financial shocks. Others, such as Litvack, Malkiel and Quandt (1974) and Tobin (1974) make the case that the endowed portfolio should be managed in isolation, with the distinct objective of accomplishing intergenerational equity.

In 2012, Dimmock studied the relationship between 'background risk', defined as the volatility of universities nonfinancial income, and asset allocation. The purpose was to see whether institutions were managing assets in isolation or in a more holistic manner. He concluded:

> *"The results show that background risk significantly predicts endowment portfolio volatility, even after controlling for many university characteristics. Increasing background risk by 1 standard deviation implies a decrease in*

portfolio standard deviation of approximately 6.6%... I also find that background risk significantly affects asset allocation. In all specifications, background risk is associated with higher allocations to fixed income securities and lower allocations to alternative assets."

Institutions taking this holistic approach may also wish to consider how their spending policy interacts with these additional revenue streams, and whether they require that spending policy to act as a financial shock absorber. **Figure P.** displays the correlations between portfolio volatility and subsequent realized distribution rates for the five blended spending methods. As reviewed earlier in this paper, negative correlations produce increased distribution rates in periods of financial distress, providing that shock absorber for total revenues. Looking at **Figure Q.** we see in the 20 year historical analysis for the 20% Blend rule. Here we see distribution rates spike higher in 2002 and 2008, providing that shock absorber for the institution, but realized distribution rates also fall below the long-term designated spending rate quickly afterward in an attempt to encourage the preservation of purchasing power. This is the key difference between how this rule operates and the popular methods. While popular methods also saw realized distribution rates spike higher, the subsequent corrective action wasn't present.

Ultimately, for institutions desiring a spending policy that acts as a shock absorber, a blended method with a greater weighting to the Hybrid rule will be preferable.

Conclusion

The Moving Average rule has been used since the institutional investment management industry shifted to the 'total return' approach in the late 1960s. As its popularity has grown over the years, so too has the criticism of this method. This paper adds to that volume of literature by dissecting the root issue inherent with the Moving Average rule, along with other popular spending methods. In an attempt to create more stable distributions, these methods have inhibited their ability to maintain purchasing power over time by creating negative correlation between distribution rates and portfolio purchasing power. This counterintuitive distribution process acts as a drag on portfolio performance over time. In addition, this has introduced considerable fiduciary risk into the process, as even small mistakes in setting spending rates significantly impact long term outcomes.

In gaining a greater understanding of the underlying issue impacting popular spending methods, we are able to create a more intuitive distribution process which maintains purchasing power over time with greater reliability. This process, described as the Purchasing Power rule, produces far more attractive long term outcomes at the cost of greater annual volatility in distributions. In addition, this process virtually eliminates the fiduciary risk tied to setting appropriate spending rates.

The construction of spending rule 'portfolios' produces an array of balanced outcomes from which institutions can choose from. Not only does this allow for customization of spending policies to suit institutional needs and objectives, but it allows for more attractive outcomes to be achieved. As this paper demonstrated, there are significant benefits for institutions that utilize spending rule 'portfolios' comprised of 60-90% Hybrid rule, and 10-40% Purchasing Power rule. These outcomes allow for cash flow volatility that is in-line with popular methods, but substantially improve the ability to retain purchasing power over time while reducing the inherent fiduciary risk.

Practitioners can use this research to facilitate a conversation about organizational goals and preferences, and use that information to build a customized spending rule which aligns short-term needs with long-term goals. Much like the development of an investment portfolio begins with a conversation about risk tolerance and return objectives, the development of a spending policy should begin with a conversation about tradeoff between cash flow stability needs against the desire to maintain purchasing power in a sustainable manner. Adopting a spending policy with this enhanced level of intentionality should give practitioners greater confidence that they are acting in the best interests of all stakeholders.

Figure A.

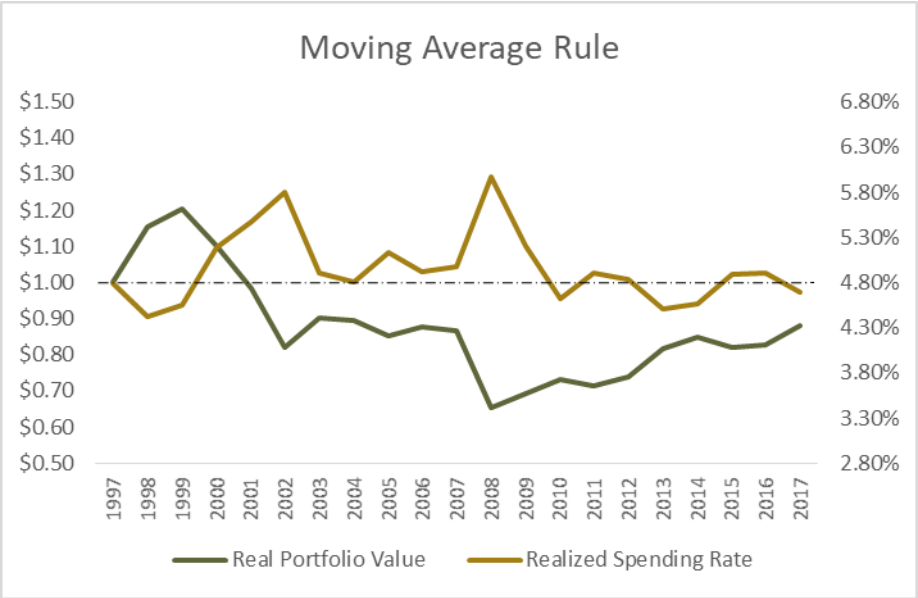
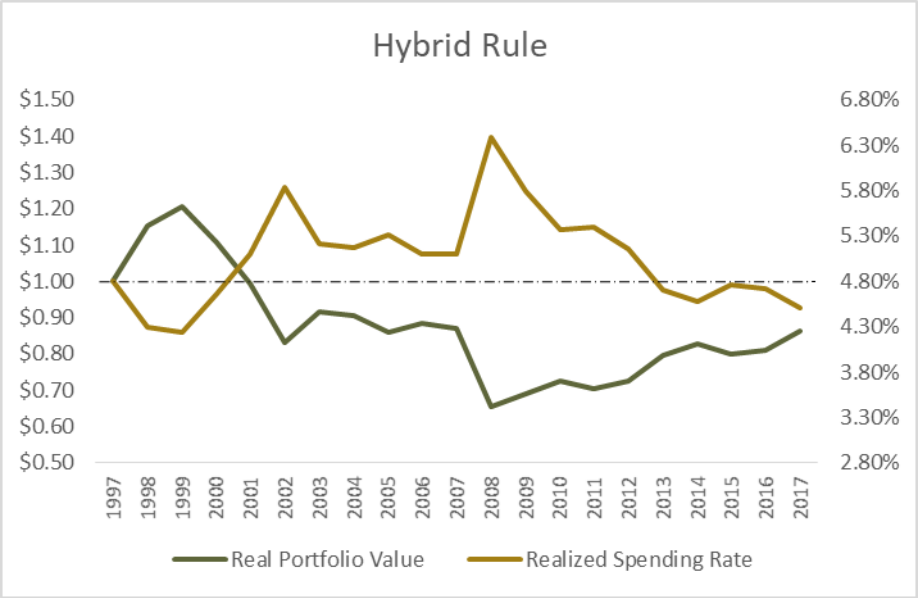
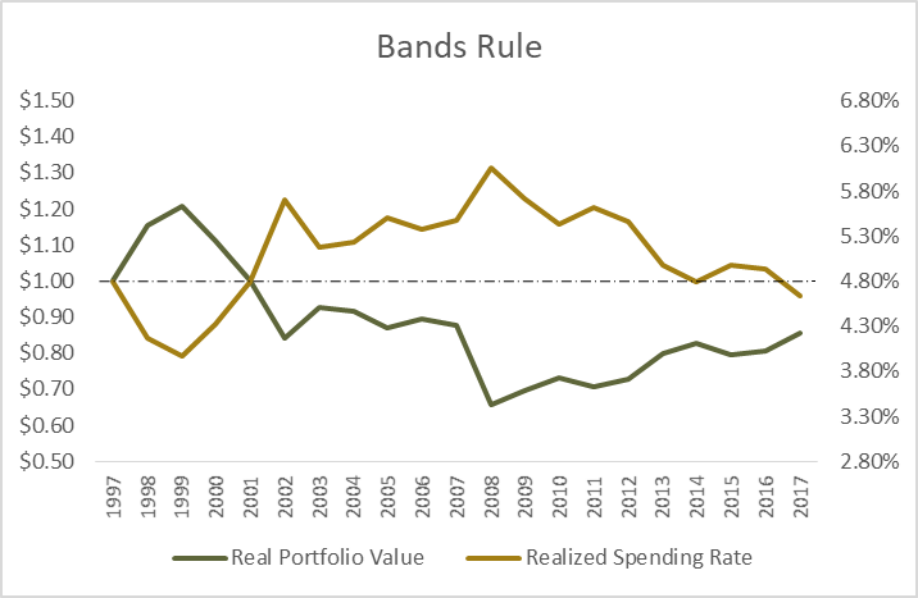


Figure B.




Bands Rule
$1.50
$1.40
$1.30
$1.20
$1.10
$1.00
$0.90
$0.80
$0.70
$0.60
$0.50
6.80%
6.30%
5.80%
5.30%
4.80%
4.30%
3.80%
3.30%
2.80%
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Real Portfolio Value
Realized Spending Rate

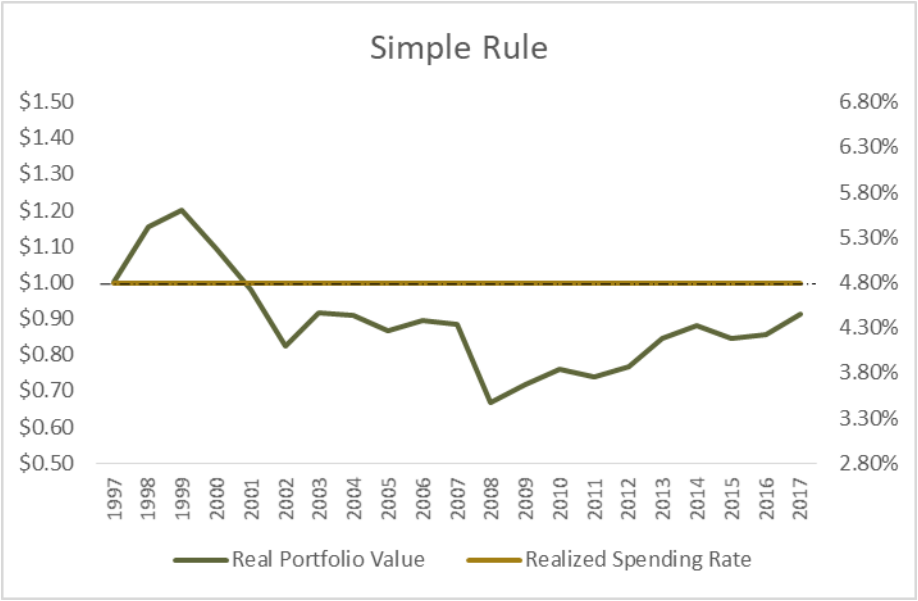

Simple Rule
$1.50
$1.40
$1.30
$1.20
$1.10
$1.00
$0.90
$0.80
$0.70
$0.60
$0.50
6.80%
6.30%
5.80%
5.30%
4.80%
4.30%
3.80%
3.30%
2.80%
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
Real Portfolio Value
Realized Spending Rate

Figure C.

SIMPLE RULE

This rule multiplies the portfolio value at a set date by the spending rate that is being utilized.

MOVING AVERAGE RULE

This rule sets current spending equal to a constant percentage of the average of previous endowment values—typically a three-year moving average, with values adjusted for inflation.

BANDS RULE

This rule sets spending at the previous year's level (in real terms), subject to upper and lower bands as a percentage of endowment value ("bands rule"). Real (inflation-adjusted) spending is changed from the previous year only if endowment value falls (rises) enough to cross the value implied by the upper (lower) band.

HYBRID RULE

Spending for the year is equal to a percentage of spending in the previous year (e.g., 80%) plus a percentage (e.g., 20%) of a target spending rate multiplied by the endowment value at the beginning of the year. (The spending level is adjusted for inflation.)

Definitions borrowed from De Santis (2014)

Figure D.

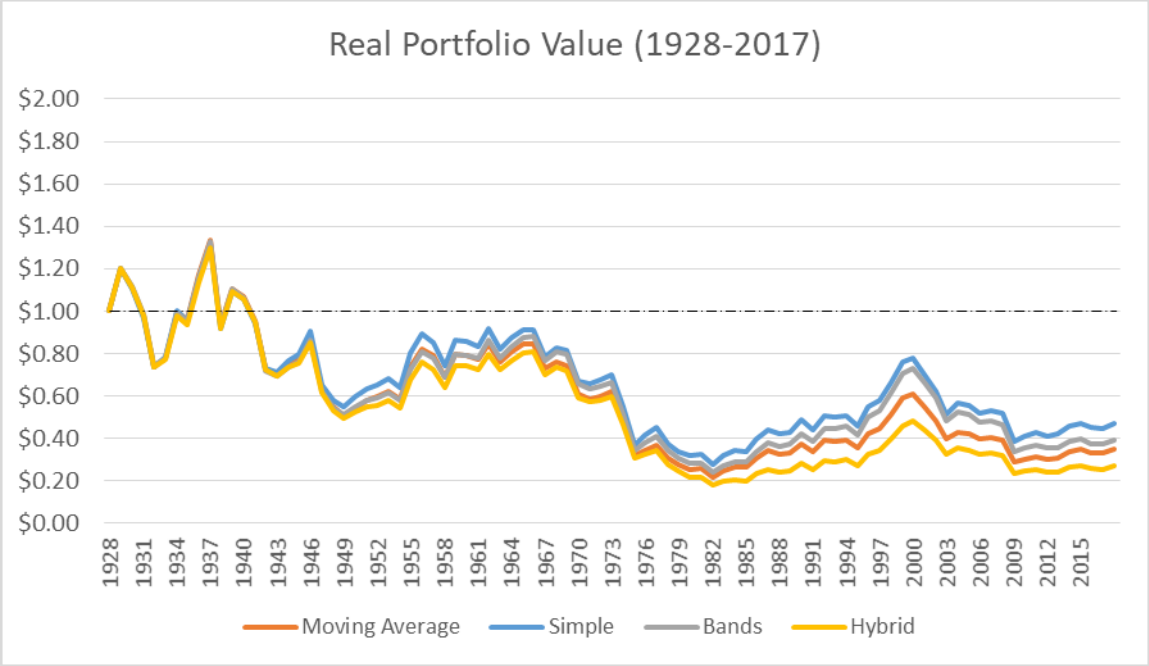


Figure E.

Rule	Correlation
Moving Average	(0.77)
Simple	-
Bands	(0.80)
Hybrid	(0.92)

Figure F.

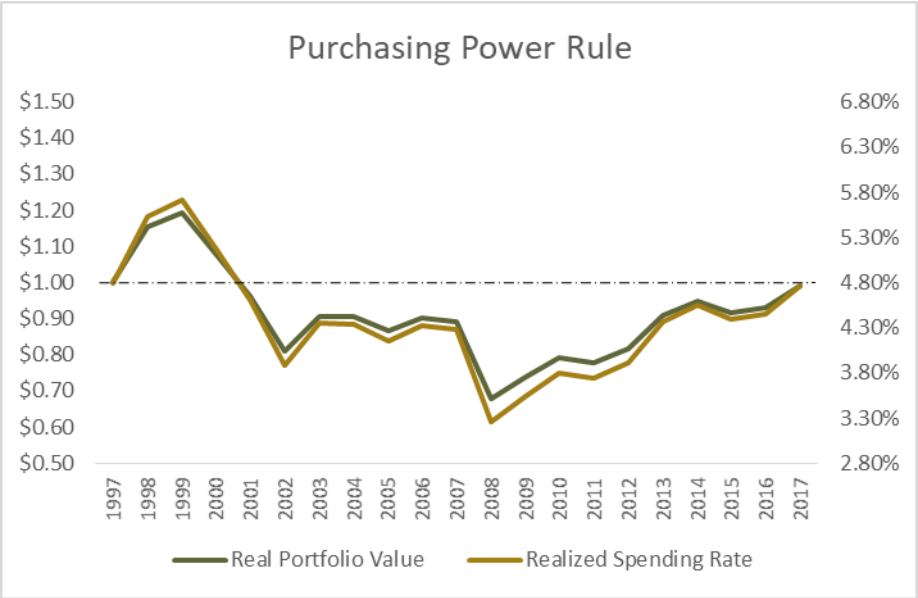


Figure G.

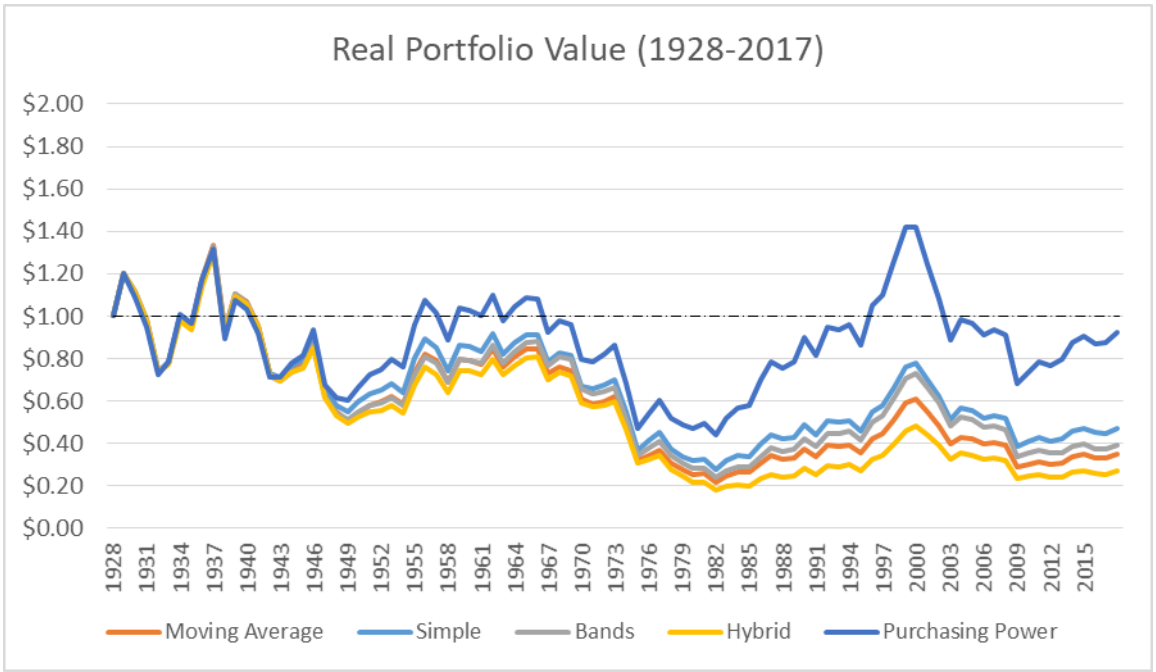


Figure H.

Rule	Correlation
Moving Average	(0.77)
Simple	-
Bands	(0.80)
Hybrid	(0.92)
Purchasing Power	0.97

Figure I.

	Moving Average	Simple	Bands	Hybrid	Purchasing Power
Median Ending Real Portfolio Value	$0.47	$0.52	$0.39	$0.29	$0.86
Median Total Distributions	$4.86	$4.98	$4.61	$4.42	$5.76
Frequency of Distribution Declines	33%	38%	20%	32%	41%
Average Distribution Decline	5%	9%	8%	3%	17%

Figure J.

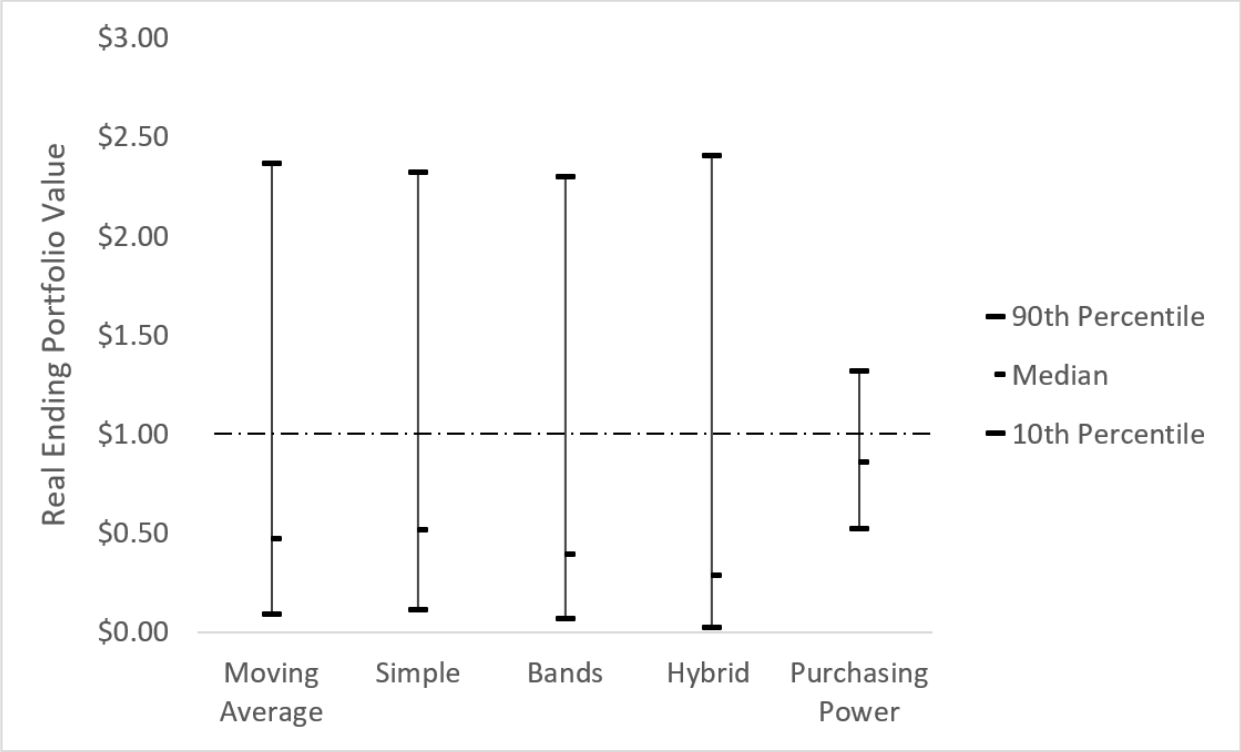


Figure K.

	1928-2017		Median Ending Real Portfolio Value				
Stock/Bond Mix	Real Return	Standard Deviation	Moving Average	Simple	Bands	Hybrid	Purchasing Power
20/80	3.4%	5.6%	$0.85	$0.85	$0.59	$0.81	$0.94
40/60	4.7%	8.3%	$0.69	$0.71	$0.53	$0.59	$0.91
60/40	6.0%	11.6%	$0.47	$0.52	$0.39	$0.29	$0.86
80/20	7.4%	15.1%	$0.32	$0.26	$0.25	$0.04	$0.79

Figure L.

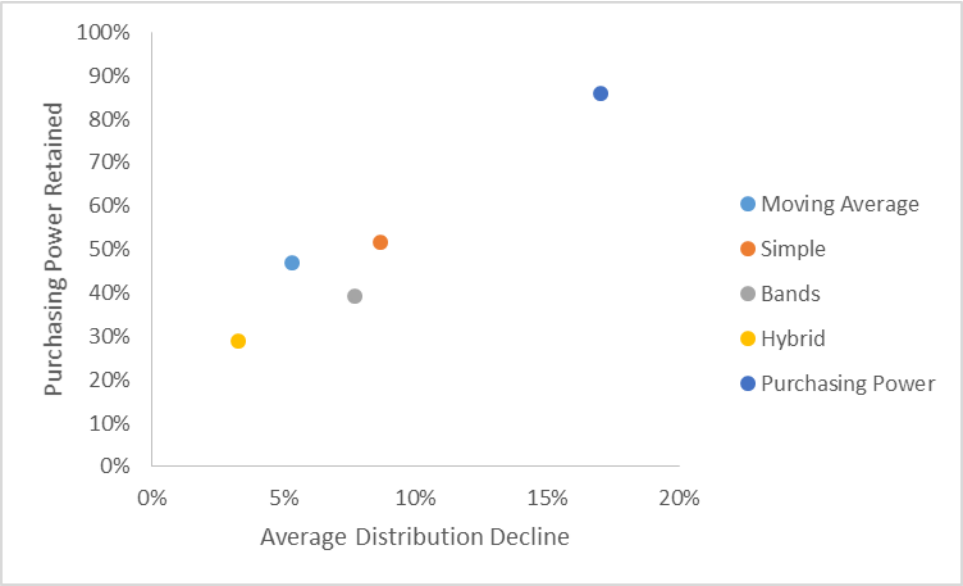

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Purchasing Power Retained
0%
5%
10%
15%
20%
Average Distribution Decline
Moving Average
Simple
Bands
Hybrid
Purchasing Power

Figure M.

	Purchasing Power Retained (Base Scenario)			Purchasing Power Retained (1% Underperformance)			Purchasing Power Retained (2% Underperformance)			Purchasing Power Retained (3% Underperformance)		
	10	30	100	10	30	100	10	30	100	10	30	100
Moving Average	94%	80%	47%	84%	72%	42%	75%	65%	37%	67%	58%	34%
Simple	94%	82%	52%	85%	74%	47%	77%	67%	41%	69%	61%	38%
Bands	93%	75%	39%	82%	67%	35%	73%	60%	30%	65%	53%	27%
Hybrid	93%	73%	29%	82%	64%	25%	73%	55%	21%	64%	47%	18%
Purchasing Power	95%	88%	86%	88%	87%	86%	81%	84%	86%	75%	83%	86%

Figure N.

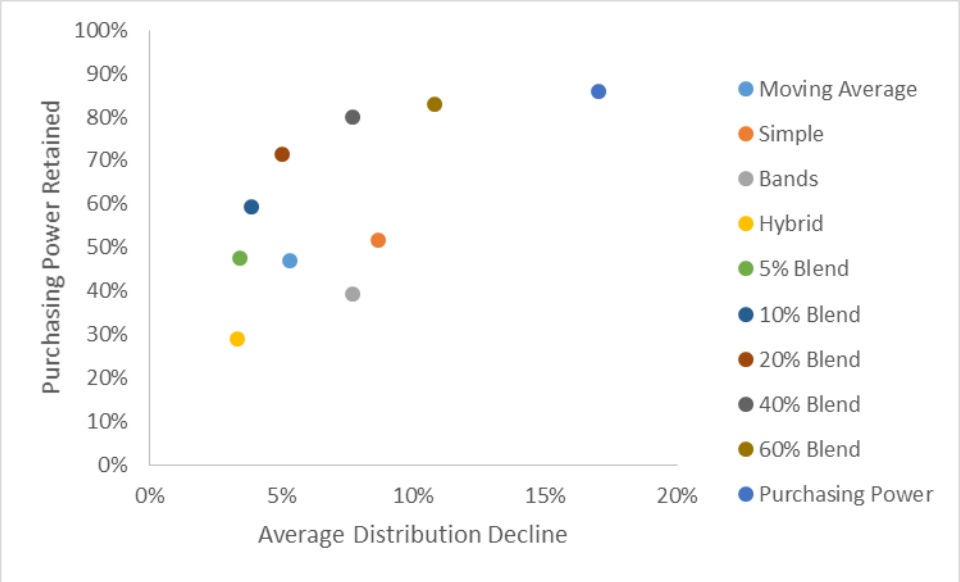

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Purchasing Power Retained
0%
5%
10%
15%
20%
Average Distribution Decline
Moving Average
Simple
Bands
Hybrid
5% Blend
10% Blend
20% Blend
40% Blend
60% Blend
Purchasing Power

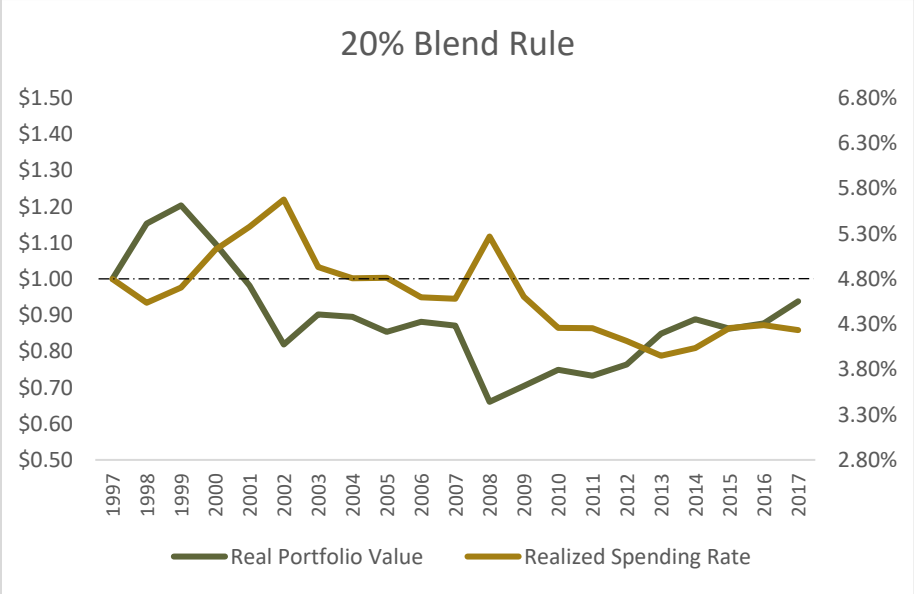
Figure O.

	Purchasing Power Retained (Base Scenario)			Purchasing Power Retained (1% Underperformance)			Purchasing Power Retained (2% Underperformance)			Purchasing Power Retained (3% Underperformance)		
	10	30	100	10	30	100	10	30	100	10	30	100
Moving Average	94%	80%	47%	84%	72%	42%	75%	65%	37%	67%	58%	34%
Simple	94%	82%	52%	85%	74%	47%	77%	67%	41%	69%	61%	38%
Bands	93%	75%	39%	82%	67%	35%	73%	60%	30%	65%	53%	27%
Hybrid	93%	73%	29%	82%	64%	25%	73%	55%	21%	64%	47%	18%
10% Blend	93%	78%	59%	83%	73%	58%	75%	68%	57%	67%	64%	57%
20% Blend	93%	82%	71%	84%	78%	71%	76%	74%	71%	69%	71%	71%
Purchasing Power	95%	88%	86%	88%	87%	86%	81%	84%	86%	75%	83%	86%

Figure P.

Rule	Correlation
Hybrid	(0.92)
5% Blend	(0.88)
10% Blend	(0.82)
20% Blend	(0.68)
40% Blend	(0.21)
60% Blend	0.48
Purchasing Power	0.97

Figure Q.



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