Practical Applications of Donuts: *A Picture of Optimization Applied to Fundamental Portfolios*

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PA 2018, 6 (2) 1-5
doi: https://doi.org/10.3905/pa.6.2.286
http://pa.iijournals.com/content/6/2/1.4

Institutional Investor Journals
1120 Avenue of the Americas, 6th floor,
New York, NY 10036, Phone: +1 212-224-3589

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Institutional Portfolio Research

Authors: Ian Domowitz and Ameya Moghe
Source: *The Journal of Portfolio Management*, Winter 2018, Vol. 44, No. 3
Report Written By: Mark Adelson
Keywords: portfolio optimization, smart alpha, overlay portfolio management

Overview

In **Donuts:** ***A Picture of Optimization Applied to Fundamental Portfolios***, published in the Winter 2018 issue of ***The Journal of Portfolio Management***, **Ian Domowitz** and **Ameya Moghe** (both of **ITG Inc**.), analyze the implications of constructing two-part portfolios consisting of an actively managed component for generating alpha and a passive component determined by a quantitative optimization process. A key aspect of their analysis is considering the effects on performance of transaction costs from active management and periodic rebalancing of a portfolio's active and passive components. They also consider the effect of portfolio size on overall transaction costs.

The authors use the metaphor of a donut to describe the design of their two-component portfolios. The hole in the center of the donut corresponds to the actively managed component, and the donut corresponds to the passive quantitatively optimized component.

Practical Applications

- **In the donut model, any form of active management can be applied to the active component,** allowing for the "often subjective and judgmental work of a fundamental portfolio manager."
- **Portfolio optimization techniques are used on the passive component as a quantitative overlay on the fundamental choices in the active component.** This allows the whole portfolio to benefit from quantitative portfolio optimization while preserving the fundamental views reflected in the active component.
- **The passive (dough) component can be viewed as a hedge to the active (hole) component.** A key design consideration in using the approach is deciding on the relative sizes of the two components (i.e., the donut and the hole).
- **The donut construction may be applied to portfolio liquidity enhancement and the management of liquidity risk.** This too can be done without changing the fundamental views of the portfolio manager.

Key Definitions

Portfolio optimization

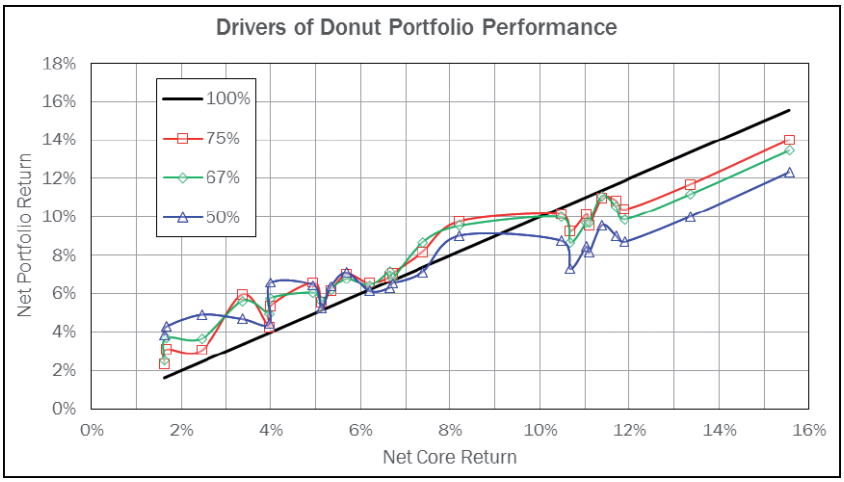
The process of selecting assets for the portfolio such that no other combination of assets could product both higher expected returns and lower variability of returns.

Smart alpha

Bruce Jacobs and Kenneth Levy coined the term "smart alpha" to juxtapose proprietary, active, multifactor investment strategies with largely passive, factor-based "smart beta" strategies. Smart alpha rests on the notion that an equity manager can identify and exploit inefficiencies in the market.

Smart beta

Smart beta refers to the class of passive strategies in which the portfolio weightings are determined by factors other than market capitalization.



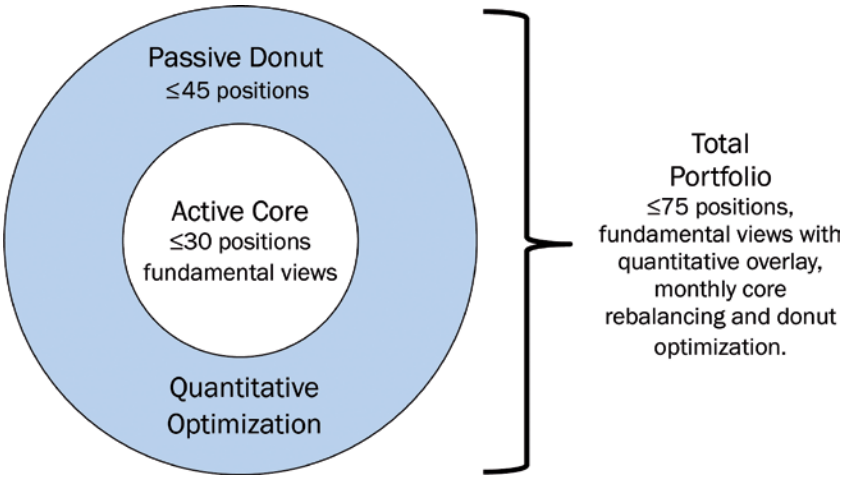
Note: Each line on the chart shows the relationship of net portfolio return to net core return for a different core ratio. Core ratio refers to the percentage of the total portfolio composed of the core. The black line shows net portfolio returns when the core ratio is 100% (i.e., the whole portfolio is the core). The red line with square markers shows net portfolio returns when the core ratio is 75%. The green line with diamond markers shows net portfolio returns when the core ratio is 67%. The blue line with triangle markers shows net portfolio returns when the core ratio is 50%. The slopes of the lines become somewhat flatter as the core ratio decreases. This indicates that increasing the size of the donut portion of the portfolio tends to reduce the variability of net returns on the total portfolio.

Discussion

The authors' analysis is independent of any particular style or approach to managing the active portion of the total portfolio. The two key variables driving performance over a large sampling of hypothetical portfolios are (i) the proportion of the total portfolio in the actively managed core (the core ratio) and (ii) the net return on the actively managed core (i.e., the return after transaction costs). The chart shows the relationships of these variables.

THE ANALYSIS

The authors construct 24 hypothetical core portfolios, each composed of 30 U.S. equities, which are rebalanced monthly subject to an 8% monthly turnover cap. The performance of the hypothetical core portfolios was measured over a sample period from 2005 to 2015, covering 118 months. The authors then construct total portfolios (i.e., core plus donut) with core ratios of 50%, 67%, and 75%—half, two-thirds, and three-quarters. They construct the donut portion of each total portfolio using a quantitative optimization process. The target for the optimization process is minimizing systematic risk tracking



> "The donut constructions permit increased fund capacity while preserving the fundamental-drive investment portfolio"
>
> —**Donuts:** ***A Picture of Optimization Applied to Fundamental Portfolios***

error relative to the Russell 1000 Growth Index. There is a limit of 45 positions for each donut portfolio. Each total portfolio is reoptimized monthly after the rebalancing of the core component. The whole process tracks the transaction costs for rebalancing and optimization.

THE RESULTS

As one would expect, the authors find that costs generally decline as the size of the total portfolio increases. More importantly, though, adding a donut to an active core also has a strong effect on reducing costs. The effect on the Sharpe ratios of adding a donut depends heavily on the level of returns generated by the core: When core returns are relatively low, adding a donut improves the total portfolio's Sharpe ratio. However, when core returns are strong, the donut has little effect. Overall, the donuts appear to lower risk and lower costs while producing only a very small drag on returns.

The key implication is that using a quantitative optimization process as an overlay to fundamental views—even views that are highly qualitative or even subjective—can produce significant and measurable benefits in portfolio performance. This shows that rather than being antagonistic toward each other, a fundamental approach and a quantitative optimization approach can be complementary and synergistic.

The authors note that the donut model can be applied usefully to the issue of liquidity risk and the requirement for mutual funds to manage liquidity risk under new SEC rules that take effect in late 2018. In analyzing liquidity effects, they allowed for up to 50

positions in the core component and tested roughly 389,000 total portfolios. The findings support the intuition that adding an optimized donut to an active fundamental core can improve liquidity when the donut optimization is tuned to do so.

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Ian Domowitz is vice chairman and a managing director at Investment Technology Group, Inc. Formerly CEO of ITG Solutions Network, Inc., he is a member of the company's executive committee. Prior to joining the company in 2001, he served as the Mary Jean and Frank P. Smeal Professor of Finance at Pennsylvania State University and previously was the Household International Research Professor of Economics at Northwestern University. A former member of the NASD's bond market transparency committee, he also served as chair of the NASD's economic advisory board. Mr. Domowitz has held positions with Northwestern's Kellogg Graduate School of Management, Columbia University, the Commodity Futures Trading Commission, the International Monetary Fund, and the World Bank.

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