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A Game-Theoretic Framework for Managing Macro Risk

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by Robert Huebscher

The William Blair Macro Allocation Fund (WMCNX) seeks to capitalize on global opportunities through active management across asset classes, geographies, currencies and risk themes. Since the inception of the fund on November 29, 2011, it has had an annual return of 5.41% (as of 8/31/16), beating its index, BofA Merrill Lynch 3-Month U.S. Treasury Bill Index, by 531 basis points over the same period. The investment team has also put together another index more in line with its targeted return profile (40% Bloomberg Barclays U.S. Aggregate Index, 30% MSCI All Country World Index (net), and 30% Bank of America/Merrill Lynch 3-month U.S. Treasury Bill Index) which it has also beaten by 115 basis points over the same time period. The management team first uses fundamental analysis to identify value/price discrepancies, which reveal where opportunities exist. It's the next step in the investment process where the investment team uses game theory to understand and assess geopolitical risks and how they will impact portfolio performance.

Thomas Clarke is portfolio manager on the Dynamic Allocation Strategies (DAS) team. In this role, Tom shares, with co-manager Brian Singer, ultimate responsibility for strategy setting and portfolio construction across all DAS portfolios. Before joining William Blair in 2011, Tom was a member of Singer Partners' investment team with a special focus on currency strategy. Until 2009, Tom was a managing director and head of currency analysis and strategy for the global investment solutions team of UBS Global Asset Management. There, he set currency strategies for multi-asset, global and international equity and fixed income portfolios and developed and oversaw the currency analysis process. Tom was also a member of the global asset allocation and currency committees and the U.K. investment committee. Before joining UBS in 2000, Tom was head of currency for Rothschild Asset Management, where he spent 10 years as part of the fixed income and currency group.

I spoke with Tom on September 12..

Bob: You are a portfolio manager on the Dynamic Allocation Strategies team and a co-manager of the Macro Allocation Fund. What is the mandate of the fund, and how is your team organized?

Thomas: The team is organized in Chicago, London and Zurich. We're a 13-person team. Most of us have worked together for about 17 years, and we were originally at UBS before we came to William Blair five years ago. That includes me and Brian Singer, the other portfolio manager for our fund.

The mandate of the fund is to seek real returns at below equity market risk using macro, top-down exposures across the developed and emerging equity world, fixed income, credit and currencies, It's all top-down; we're not buying and selling individual bonds or picking stocks. We're investing at the country, asset class and sector levels. We do currencies as a separate investment decision.

Bob: You and Brian have recently published research on the application of game theory to fund management. What was the genesis of that effort?

Thomas Clarke

Thomas: The genesis of that effort was that we sought a way of understanding and navigating geopolitical risks as they affect market prices and exchange rates. Most everybody, across the investment community, agrees that geopolitical risks are very important and influential on markets, but there is not much consensus about how to account for those risks in managing portfolio exposures. We developed a framework that uses game theory to assist us in that effort.

Bob: One of the pieces that you published is a take-off on the story of Rocky and Bullwinkle. Can you talk about how that ties into your assessment of the macro landscape, and how it affects the way you invest?

Thomas: The Rocky and Bullwinkle example is a somewhat humorous, non-investment scenario that brings out the features of the way we look at geopolitical scenarios that are influential on investment management. What we are seeking to do with this framework is not to discover information that nobody else knows, but rather to better organize the same information that everybody knows so that we can be less surprised by geopolitical outcomes and a little bit more anticipatory of their investment implications.

To that end, whether we are dealing with Rocky and Bullwinkle, which wasn't about investments, or with policy negotiations between leaders, political maneuvering, referendums or even military situations, we set up a framework where, in line with the example of Rocky and Bullwinkle, we seek to identify the primary players in the negotiating game. All of these situations can be thought of as multiplayer, strategic interactions.

We want to discover who the players are in each situation, their objectives, whether those objectives are aligned, if they want the same or similar things or whether they've got opposing objectives, which means they are in conflict with each other. Thirdly, we want to assess who is the more powerful player on various dimensions of bargaining power. That gives us a framework where we will be a little less surprised by the risks, the outcomes and the investment implications of each situation.

We've used this recently with Brexit, the referendum on the E.U. membership in the U.K. a couple of months ago, and before that, the negotiations between Greece, the Eurozone and the IMF in respect to bailout, austerity and restructuring. We've also used it to understand the situation between Russia and the West regarding the Ukraine, and the implications of Middle East politics on oil markets. In each case, it's given us additional insights that supplement the fundamental valuation backdrop to the way we put together an investment portfolio.

> **"The E.U. referendum in the U.K. had just two players, "stay" and "leave." What were their objectives? One of them wants to leave the E.U; the other one wants to remain."**

Bob: In the most recent example, the Brexit vote and referendum, how did you apply that analysis?

Thomas: It was actually quite a simple and good example. It could be seen as very obvious. But the framework is also useful when things are more complex.

We view all these things as a negotiation between players. The E.U. referendum in the U.K. had just two players, "stay" and "leave." What were their objectives? One of them wants to leave the E.U; the other one wants to remain. They've got, straight off the bat, irreconcilably opposing objectives. They can't shake hands, do a deal and both win and stay in as well as come out. One can only win if the other one loses. So, that is a confrontational scenario.

Then we want to ask, "Who is the more powerful?" If one side has all the power and the other has none, it doesn't really matter if they're in conflict. You know the outcome. That wasn't the case with Brexit. The best gauge of the relative power were the opinion polls. The polls were all the time very close, and a little bit incorrectly biased towards stay, but in summary you've got two players, opposing objectives and almost equal power.

In an investment sense, that means that these two players have a mutual incentive to deliberately raise the stakes and increase risks. They've got an objective or a reason to dial up the noise, to issue threats, warnings and forecasts of doom if the other side wins. That injects additional risk and uncertainty that markets tend not to like. It's a risk factor for U.K. assets and the British pound on top of "normal" risk.

Also, this impacts returns looking forward and compensation from risk exposure to U.K. prices, because the driving force behind the vote to leave the E.U. was that there was a significant number of voters who wanted to reduce free migration between the U.K. and Europe. It was inevitable that there would be reduced free trade as well if the U.K. were to leave. So there was a probability, meaningfully high, of an outcome with less free movement of labor, goods, services and capital; all of which are textbook growth negatives. At the same time, the setup was such that the two sides are going to increase the risk level.

The investment implications that came out of this rather simple game theater were that it was riskier to hold U.K. equities and to be long on British pound.

Bob: How did that affect your portfolio decisions?

Thomas: The first step of our investment decision-making process is to assess price versus fundamental value. At the beginning of the year, we viewed U.K. equities as a fundamentally attractive market. We had a bias to be long U.K. equities. This game theater implication caused us to significantly scale back the amount of long exposure we took in U.K. equities. We also protected a good bit of it with put options, which meant the downside was nonlinear or convex. It would take us out of the market in the event of a downturn.

We managed the currency decision as a separate decision. At the beginning of the year, we were fundamentally negative on the British pound. We saw it as an expensive currency. Its price was above its long-term fundamental value. We had a bias to be short, and if you add in the geopolitical situation, that gave us an additional bias to be further short.

As a result of our analysis of Brexit, we went into the referendum with a much reduced but long U.K. equity position and a bigger and short U.K. pound position. As it happened, we didn't expect the result to be any different from the consensus. It was a surprise, but because it was a surprise, you could tell in advance that if the vote was to remain there would be limited up-move of U.K. equities and not much on the pound. But if the vote was to leave, as it was, there would be quite a sharp downward reaction in both. Our portfolio was well equipped to navigate that on the day of the vote. In performance terms, it didn't show up as anything more than a blip. In fact, we had a slight gain from the impact on U.K. equities and the pound through the situation overall because of the way we had positioned against the short pound but limited the long equity.

After the event, a lot of the uncertainty passed and we were able to cover our short pound exposure. We have not yet meaningfully rebuilt the U.K. equity exposure, but we have removed the option protection that we had.

There's a fair number of moving parts to that very simple example. But hopefully, you can get from that some of the ways in which this helps us to evaluate what the short-term risks will do to the fundamental opportunity that we strive to capture.

“Our investment landscape, as I said, is in developed and emerging equity and fixed income and credit and currency.”

David: Your fund holds ETFs, futures contracts, options and cash. How are overall asset allocation decisions made, and what is the construction process?

Thomas: We hold those derivatives to get the exposures that we want in our strategy. We are conceptually indifferent to whether we use futures or ETFs. We use whichever is the cleanest and most efficient at getting the top-down exposure we want. The construction process starts, in all cases, from an assessment of fundamental values for equity markets, sectors, government bonds, credit spreads and exchange rates. We look at where investment opportunities arise where prices are materially different from fundamental values across our investment landscape. Our investment landscape, as I said, is in developed and emerging equity and fixed income and credit and currency.

When we see a significant discrepancy between price and fundamental value, that is a sign, but it's only a sign that we need to look further and evaluate whether those opportunities are likely to be compensated or not over shorter investment horizons. Fundamental valuation is, in our view, necessary because we earn a significant excess return over time from the inevitable correction of value versus price discrepancies. This was true with the deep discount that most equities had in early 2009, the strong overvaluation that commodity-sensitive currencies had in 2011 and the attractiveness of some of the same currencies in 2015.

Price reverts to value over a five- to eight-year investment horizon. That's quite long term. That's too long for clients to withstand if those opportunities are not navigated in respect of the non-valuation influences that also move prices. Those non-valuation influences include geopolitical risk, and those feature in the second step of our process where we also seek to evaluate the macro-thematic influences that are not necessarily geopolitical, such as a commodity cycle which cuts across the investment landscape and impacts the prices of equities, bonds and currencies.

Those non-valuation influences, geopolitical risks and macro-themes are separate from valuation. Sometimes they act in the same direction as valuation in moving prices, in which case that's fine. We will tend to fully expose the portfolio to valuation opportunities that we see or be more aggressive in taking risks than the gap between price and value alone would warrant. But sometimes, the shorter term influences act in the opposite direction from value, and in that case, as we did with U.K. equities, we fade opportunities in the short term in the portfolio.

Bob: How is risk managed in the portfolio?

Thomas: We are highly dynamic in our use of the portfolio's risk budget. Ten percent is the expected average risk that we'll take in the portfolio over the long term, but it can be quite a lot lower as it is now, or it can be considerably higher, as it was in 2012 and 2013. It depends on the intensity and the nature of geopolitical and macro-thematic influences and whether they line up with the direction in which valuations are pulling prices, or whether they oppose it and raise volatility and correlations in some cases, which can reduce market breadth.

We developed two of our own proprietary forward-looking risk models to do this, and the second risk model is derived from the first one. The first risk model is our long-term equilibrium variance/covariance matrix for the investment universe in which we operate. That's got a very, very long forward-looking horizon, about 10 to 20 years, and it reflects the normal covariance structure of the marketplace in which we need return opportunities to adequately compensate us when we're taking risk positions in the strategy. It does not incorporate geopolitical situations or macro-thematic influences or anything like that. It's just a long-term, normal level of risk in the marketplace, volatilities and correlation.

The second risk model is a shorter term. We call it our "outlook" risk model. To get that one, we bend the volatility and covariance assumptions out of equilibrium in accordance with the geopolitical and macro-thematic influences that we identify and that we judge are influencing market behavior. That risk model has a horizon of one to three years, rather than 10 to 20.

It's important because we start by looking at fundamental return opportunities dictated by price less the fundamental value. But if short-term risks or correlations are elevated such that breadth is reduced, more markets are moving together and there's not so much independence, then even if fundamental value hasn't changed, the same return opportunities become less compelling.

That is what guides us to manage the risk exposure in the portfolio down in that scenario. It's a combination of expected return versus fundamental value and long-term and shorter term forward-looking risks.

Bob: Since the inception of the fund on November 29, 2011, it's had an annual return of 5.41%, which is 115 basis points ahead of its benchmark, the long term comparative index. What's been the source of your outperformance?

Thomas: First, the comparative index is a de-levered market portfolio, which is 30% global equities, 40% bonds and the rest cash, and it's all hedged back to the U.S. dollar. We publish that comparative index because it is an investable alternative to the portfolio. The true performance benchmark of the macro allocation fund is U.S. CPI plus 6%. That is our return objective, but that is not an investable portfolio. It's necessary from a regulatory perspective that we also quote an investable comparative, which is the long-term comparative index.

The sources of the performance over the five-and-a-bit years since inception are quite diversified. We've had about half of the 5.41% from market exposures across equity and fixed income. Within market exposures, the contribution has been mostly from developed equities in North America, Europe and Japan, with a slight drag from emerging equities. We've also had a positive contribution on the market side from credit exposures over their history, but there has been a drag from government duration, where we were outright short government duration in the early years. More recently, we've significantly reduced our risk there.

Approximately the other half of the returns over time have come from currency, which as I said is managed separately, and those gains have come from mostly the developed world and also several emerging currencies in Asia.

Bob: The fund has over 30% in cash. Is that a reflection of a lack of opportunities that you see in the market?

Thomas: Yes, it is a reflection of the lack of opportunities but also the headwinds in the way of those opportunities; however, we don't expect to be fully invested in market exposure in the portfolio on average over a long term. It will be less than fully invested because we target a beta to global equities of about 0.3 to 0.4 over time, which is not consistent with being fully invested.

But today, we have less market exposure than typical. In particular, it's about 25% total equity exposure and very, very little fixed income and credit. It's not so much that the opportunities are absent from a value versus price perspective, but that shorter term influences have been clouding those and causing us to hold the risk level quite low. In the last few weeks, we've been increasing the risk in the portfolio and that cash is reducing. But for the last 12 months, it's been non-typically high.

Bob: In your most recent market commentary, you wrote, "We feel compelled to maintain a strategy of de-risked investment exposures in the domain of systematic (or beta-like) market risk, as well as lower risk exposures to attractive emerging currencies than would otherwise be the case." Can you elaborate on that?

Thomas: It speaks to what I've talked about already a bit. If fundamental valuations are unattractive, we stop there. Then we're going to take an amount of risk exposure that is commensurate with the long-term opportunity. We have more systematic or beta-like market risk in a portfolio today due to the attractiveness of several equity markets, notably in the emerging world, Europe and the U.K. We also have more emerging currency exposure for the same reason. But, the various geopolitical risks, which include things like the rise of populism and how it is impacting opportunities in Italy and Spain, for example, as well as the U.K., push against the valuation opportunities. They make them less compelling.

One of the macro themes that has been particularly influential over the last few years is what we call the "commodity supercycle." Basically, it is the dominance of commodities in impacting the prices of commodity-sensitive assets and currencies and the secular downtrend in the commodity price level. It has been acting in an opposing direction to the valuation orientation of many emerging currencies, which are also significantly commodity exporters.

We've got medium-sized valuation opportunities across this space, but shorter term headwinds getting in the way of those that serve to keep the value-to-price gap wide or even exacerbate that gap and move prices away from fundamental valuation, which has been the case in the past. For that reason, the first and second steps of our decision-making process are opposing each other, so we end up taking less risk in those domains than in other environments where, say, the geopolitical or macro headwinds were not as strong or absent or even were tailwinds.

> **"...the best opportunities that we see are still in European equities and emerging currencies."**

Bob: Given your macro outlook, which sectors or geographic regions present the best opportunities for your fund, in particular, over the last few weeks as you've been decreasing your cash position?

Thomas: One of the ways in which we've been decreasing our cash position is that we have significant optionality in some of our market exposures. We hold those exposures with options, which means, notwithstanding the last couple of days, as markets have moved higher, those options are going to kick in and increase our exposure and decrease our cash position. It's like synthetic cash, not actual cash, but it works the same. That has increased our exposure as markets have gone up. That's a good thing, all else being equal. We want that convexity if it protects the downside but helps participation in upside.

Having said that, the best opportunities that we see are still in European equities and emerging currencies. They're just not as compelling as they could be, and likely, ultimately will be looking forward. But also some sectors within equities, such as energy and utilities, are becoming more attractive, and energy is probably less held back today than it was from commodity influences, partly because commodities have already fallen a long way, and indeed, they've stabilized and recovered a good bit over the last six months.

Frontier equity markets are emerging as an opportunity that's typically uncorrelated with overall market beta. We like that. I'm not talking about big exposures, but it's an area in which we have been taking small amounts of risk exposure. We also like relative-value exposures that are not systematic. They're not long or short the market. We do see pockets of overvaluation that are matched by under-valuation elsewhere. For example, we are quite short Mexico equities and South African equities and long other emerging equities that are attractive. It's good to exploit those differences because it doesn't just rack up market beta exposure. Short Japanese equities are also relatively compelling in this environment because of that market's overvaluation compared to other attractive ones.

The pound short that we had through the Brexit referendum is now closed. Indeed, it's depreciated by about 15% since a few months ago. That's gone away, and when that happened, we took risk off the table.

Bob: Lastly, what are the key distinctions between your fund and its competitors?

Thomas: Number one, our investment universe makes more use of low correlation, active currency exposures than is typical for our peers. That's apparent if you were to look at our investment universe because it contains 33 currencies. We now have exposures to about 20 of those on the long or the short side, and only a couple of them we've never used in five years. Our more generous risk allocation to currency over time is a bit of a differentiator, and that also comes through, as you asked before, in a relatively greater share of the long-term diversified returns coming from currency.

Number two, our forward-looking risk model is unique to us, as is our dynamic use of risk budgets, where we'll actively take high risk and low risk depending on the environment. We don't target a single level of risk and keep the portfolio at that level, come what may. Sometimes we'll go very, very low risk and have a good bit of cash, as now. Other times we will believe it is fertile ground to take higher risk exposures, and we'll take the risk level up.

The third differentiator would be our unique framework for accounting for geopolitical risks. If everyone believes those things are important but there's not much agreement about what to do about them, we think we've found a way that enables us to do more than simply step out of the way when something happens. The example of taking a bigger short position in the British pound is certainly not stepping out of the way because if something were to happen, it would be using it to the portfolio's advantage.

Those three differentiators allow us to keep a long-term focus on fundamental value because that's important. Fundamental value should be navigated for short-term influences, though it should never be completely jettisoned due to too much focus on the short term, which is the case with some investors. They can lose sight of the long-term anchor if there's a lot going on that doesn't seem related to it.

William Blair

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After 9/30/16, this material must be accompanied by a William Blair Fund Update, which includes performance data for the most recent calendar quarter.

The Macro Allocation Fund's Class N share 1-year, 3-year, and since inception (11/29/2011) performance returns as of August 31, 2016 are as follows:

Period ending 8/31/16 (%)	1 Yr	3 YR	Since Incep
Macro Allocation Fund	-2.77	1.60	5.41
BofA/Merrill Lynch 3 Month U.S. Treasury Bill Index	0.23	0.10	0.10
Long-Term Comparative Index*	4.85	3.94	4.26

Expense Ratio for Class N shares (gross/capped): 1.56%/1.35%

The Fund's Adviser has contractually agreed to waive fees and/or reimburse expenses to limit fund operating expenses until 4/30/17. After that date, there is no assurance that the Fund's expenses will be limited. The Capped Expense does not reflect acquired fund fees and expenses of 0.14%. The Fund's net expenses paid may be different. Please refer to the Fund's Prospectus for more information on the Fund's expenses.

Performance cited represents past performance. Past performance does not guarantee future results and current performance may be lower or higher than the data quoted. Returns shown assume reinvestment of dividends and capital gains. Investment returns and principal will fluctuate with market and economic conditions and you may have a gain or loss when you sell shares. For the most current month-end performance information, please call +1 800 742 7272, or visit our Web site at www.williamblairfunds.com. Class N shares are available to the general public without a sales load. Class I shares are available only to investors who meet certain eligibility requirements.

* The Long-Term Comparative Index is comprised of the following indices: 40% Bloomberg Barclays U.S. Aggregate Index, 30% MSCI All Country World Index (net), and 30% BofA/Merrill Lynch 3-month U.S. Treasury Bill Index. The Index is unmanaged, does not incur fees or expenses, and cannot be invested in directly.

Risks: The Fund involves a high level of risk and may not be appropriate for everyone. You could lose money by investing in the Fund. There can be no assurance that the Fund's investment objective will be achieved. The Fund holds equity exposures, which may decline in value due to both real and perceived general market, economic, and industry conditions. Investing in bond markets is subject to certain risks including market, interest-rate, issuer, credit, and inflation risk; investments may be worth more or less than the original cost when redeemed. Derivatives may involve certain costs and risks such as liquidity, interest rate, market, credit, management and the risk that a position could not be closed when most advantageous. Investing in derivatives could lose more than the amount invested. Investment return, principal value, and yields of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Investments are subject to a number of types of risk, including counterparty and contractual default risk. For a more detailed explanation and discussion of these and other risks, please read the Fund's Prospectus. The Fund is designed for long-term investors.

The Fund may use investment techniques and financial instruments that may be considered aggressive—including but not limited to the use of futures contracts, options on futures contracts, securities and indices, forward contracts, swap agreements and similar instruments. Such techniques may also include short sales or other techniques that are intended to provide inverse exposure to a particular market or other asset class, as well as leverage. These techniques may expose the Fund to potentially dramatic changes (losses) in the value of certain of its portfolio holdings.

Investments are subject to a number of other different types of risk, including market risk, asset allocation risk, credit risk, commodity risk, counterparty and contractual default risk, currency risk, and derivatives risk. For a more detailed explanation and discussion of these risks, please read the Fund's prospectus.

Please carefully consider the Fund's investment objective, risks, charges, and expenses before investing. This and other information is contained in the Fund's prospectus, which you may obtain by calling +1 800 742 7272. Read it carefully before you invest or send money. Investing includes the risk of loss.

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