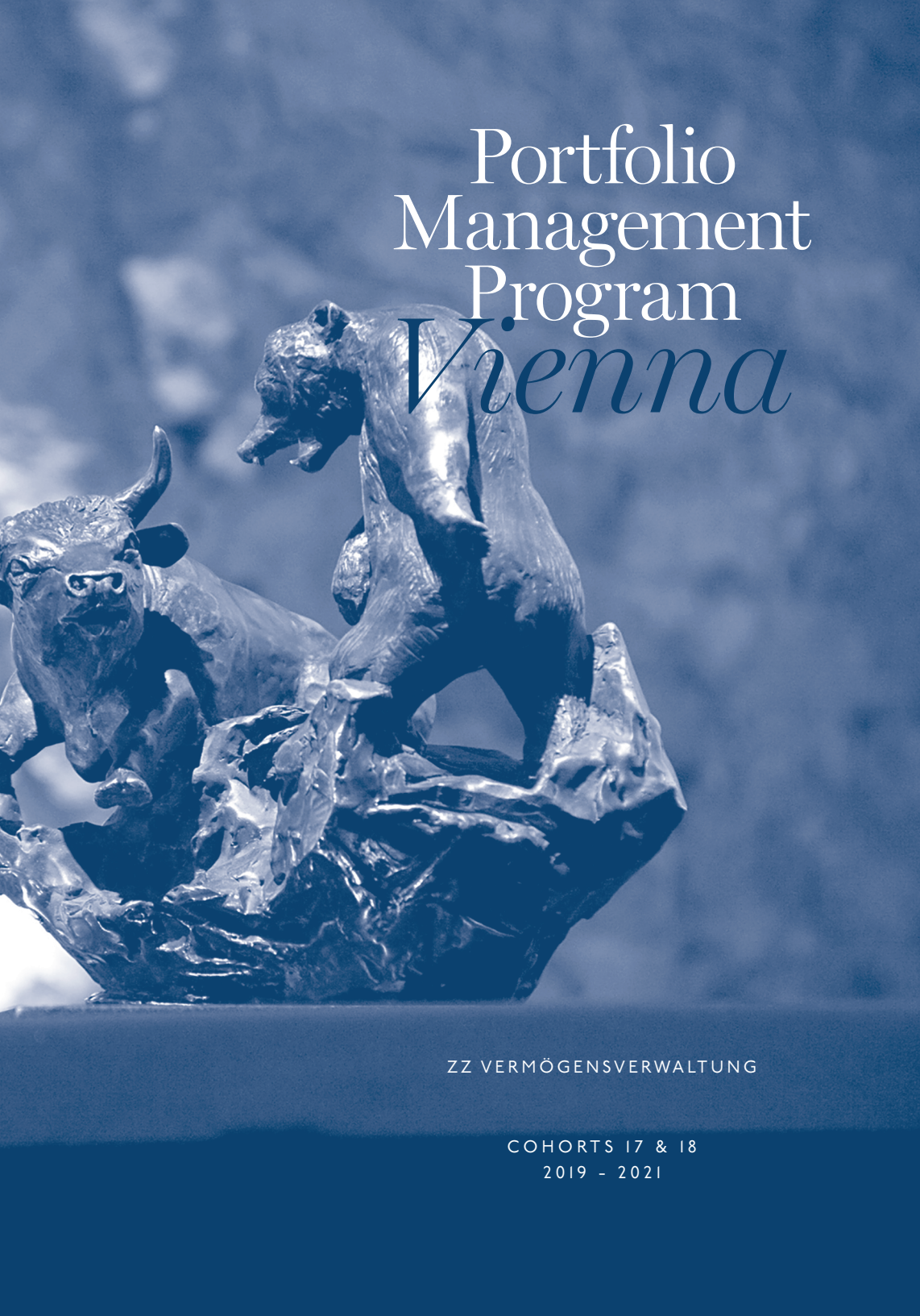

# Portfolio Management Program *Vienna*

ZZ VERMÖGENSVERWALTUNG

COHORTS 17 & 18
2019 - 2021

# Portfolio Management Program Vienna

COHORTS 17 & 18

2019 - 2021

MAY 31ST, 2021

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

ZZ VERMÖGENSVERWALTUNG

POK PÜHRINGER PRIVATSTIFTUNG WIEN

PETER PÜHRINGER, ENGELBERT DOCKNER, CHRISTOPH BADELT

In May 2021, the 18th cohort of the Portfolio Management Program in Vienna successfully completed their exciting two-year period as analysts and PMP managers. The three groups mastered the challenges extremely well. Returning optimism along with ongoing central bank measures to keep interest rates low led to an environment where active investment decisions allowed for attractive returns. At the same time, currency markets turned out to be difficult. Investment strategies and outcomes turned out to be heterogeneous across the three groups, allowing for a great learning experience.

From a practical side, the ongoing Covid-19 crisis made group work and interaction with instructors, tutors and guest speakers more difficult. Vivid discussions in front of the Bloomberg screen in the Palais Coburg are difficult to replicate in a Zoom meeting. Yet on the plus side, virtual meetings allowed us to make the PMP even more international this year by inviting the Zurich and Berlin groups to expert talks. We were extremely happy that Mr Pühringer could join us during the final presentations. We expect that on-site meetings will soon be possible again and encourage the recent graduates to participate at the future alumni meetings in the Palais Coburg.

From the beginnings of the program, we have enabled students to combine state-of-the art academic methods with the market know-how of experienced practitioners. We strive to enable the younger cohorts (the analysts) to learn from the older cohorts (the managers), thereby providing a catalyst for constant improvement. As academic directors, we feel that we have made considerable progress in the past year to further secure the quality and institutionalize the learning experience of students. Let us mention two important examples. First, students have been granted access to the ZZ Knowledge Base with a multitude of research articles, commentaries, and above all, investment analysis apps. With one of the apps, it is now easy to compare the cyclically adjusted price-earnings ratios (CAPE) of various stock markets and use that information for investment decisions. A second example is our efforts to further strengthen the methodological basis for portfolio management with the technical meetings. To make them accessible for students with little programming skills and interesting for more advanced analysts, we will complement them with an R workshop in the first months of the analyst year.

The success of the PMP would not be possible without the passion and stringency of our tutors. We would like to thank Richard Boulanger, Stephan Kranner, and Stefan Vincenz for their continued support. They not only bridge the gap between textbook knowledge and investment wisdom as exemplified by the Pühringer group, but help students develop coherent investment strategies, improve their investment knowledge, and strengthen their presentations and communication skills. We also thank the entire ZZ team of asset managers, risk managers and administrative support.

Finally, and importantly, we would like to congratulate the recent graduates and encourage current and future PMP students. Markets can be benevolent and troublesome at times. While students rarely appreciate a crisis in real-time, those are the times when they make the most valuable experiences. Our program relies on the personal initiative and accountability of the participants. Student effort in the PMP always translates into outstanding learning experiences and career prospects.

Otto Randl, Giorgia Simion, and Josef Zechner

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# German executive summaries



COHORTS 17 & 18

PETER PÜHRINGER

„Nur in Krisen- und Crash-Phasen kann ein nennenswerter Kapitalstock aufgebaut werden, weil nur in diesen Phasen massiv in eindeutig „Werthaltige Assets“ investiert werden kann.“

Im Mai 2021 absolvierte der 18. Jahrgang das zweijährige Portfolio Management Programm. Zahlreiche Herausforderungen wurden von den drei PMP-Gruppen ausgesprochen gut bewältigt. Der zurückkehrende Optimismus sowie fortlaufende Maßnahmen der Zentralbank den Zinssatz niedrig zu halten, schafften ein Umfeld, in dem aktive Investitionsentscheidungen attraktive Renditen ermöglichten. Gleichzeitig erwies sich der Währungsmarkt jedoch als schwierig. Eine große Variation an Investmentstrategien als auch unterschiedliche Renditen in den einzelnen Gruppen erlaubten eine tolle Lernerfahrung.

Von der praktischen Seite betrachtet war die Interaktion mit den Lehrenden, Tutoren und Gastreferenten aufgrund der Covid-19-Krise schwieriger. Angeregte Diskussionen vor dem Bloomberg-Bildschirm im Palais Coburg können kaum von einem Zoom-Meeting ersetzt werden. Andererseits ermöglichten uns Online-Meetings das Portfolio Management Programm noch internationaler zu gestalten, indem die Gruppen aus Zürich und Berlin zu diversen Expertenvorträgen eingeladen wurden. Wir waren sehr erfreut, dass Herr Pühringer bei der finalen Präsentation teilnehmen konnte. Wir gehen davon aus, dass Meetings im Palais Coburg bald wieder möglich sein werden und wir regen rezente Absolventen an bei zukünftigen Alumni-Treffen teilzunehmen.

Seit Beginn des Programms ermöglichen wir Studierenden, aktuellste akademische Methoden mit dem Markt-Know-How von erfahrenen Praktikern zu kombinieren. Indem jüngere Jahrgänge (Analysten) von älteren Jahrgängen (Managern) lernen kommt es zu permanenter Weiterentwicklung. Als akademische Richtungsweiser haben wir das Gefühl in den letzten zwei Jahren erheblichen Fortschritt gemacht, die Qualität des PMPs weiter sicherzustellen und die Lernerfahrung der Studierenden zu institutionalisieren. Zwei Beispiele verdeutlichen das. Zunächst erhielten die Studierenden Zugang zur ZZ-Wissensplattform mit einer Vielzahl an Recherche-Artikeln, Kommentaren und vor allem auch Investment-Analyse-Apps. Eine dieser Apps ermöglicht es nun, einen Vergleich von zyklisch angepassten Kurs-Gewinn-Verhältnis (CAPE) von verschiedensten Aktienmärkten durchzuführen und die Information für Investment-Entscheidungen zu nutzen. Ein weiteres Beispiel ist unsere Bemühung die methodologische Basis für das Portfolio Management mit Technical Meetings weiter zu stärken. Um die Technical Meetings für fortgeschrittene Analysten als auch zugänglich für Studierende mit weniger Programmierwissen interessant zu machen, werden wir einen R-Workshop in den ersten Monaten des Analystenjahres einführen.

Der Erfolg des Portfolio Management Programms wäre nicht möglich ohne die Leidenschaft und Konsequenz unserer Tutoren. Wir danken Richard Boulanger, Stephan Kranner und Stefan Vincenz für ihre fortwährende Unterstützung. Sie schließen nicht nur die Lücke zwischen Lehrbuchwissen und Investment-Weisheit – wofür die Pühringer Gruppe exemplarisch angeführt werden kann,

sondern helfen auch Studierenden koherente Investmentstrategien zu entwickeln, ihr Investmentwissen zu erweitern und die Kommunikations- und Präsentationsfähigkeiten zu verbessern. Wir bedanken uns auch beim gesamten ZZ-Team der Asset-Manager, Riskmanager und Administration.

Zu guter Letzt möchten wir den Absolvierenden gratulieren und auch die momentanen und zukünftigen PMP Studierenden ermutigen. Märkte können wohlgesonnen aber auch problembehaftet sein. Für Studierende ist gerade eine Krise jene Zeit in der sie die wertvollsten Erfahrungen sammeln können. Unser Programm vertraut auf die Eigeninitiative und Verantwortung der Teilnehmenden. Der Einsatz der Studierenden im PMP bedeutet immer außergewöhnliche Lernerfahrung und Karriereaussicht.

Otto Randl, Giorgia Simion, und Josef Zechner

# Portfolio Management Program

2019 – 2021 • ACADEMIA MACRO FINANCE GROUP



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TUTOR
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31. MAI 2021

Der Schwerpunkt der Academia Macro-Finance Group liegt auf der Analyse von zyklischen makroökonomischen Dynamiken. Strategien fußen auf theoretischen Erkenntnissen und empirischen Belegen, abgeleitet aus aktueller Forschungsliteratur.

Die Übernahme des Portfolios erfolgte kurz nachdem die Märkte ihr Tief in Folge der Pandemie erreicht hatten. Wir erwarteten eine Erholung, sodass wir uns veranlasst sahen, den Equity-Anteil des Portfolios zu erhöhen und den Anteil an Investitionen in Bonds zu verringern. Das geringe Verhältnis des Small-Cap-Index zum Large-Cap-Index war dabei ausschlaggebend für unseren Fokus auf

Small-Cap Positionen. Des Weiteren reduzierten wir unsere Investments im asiatischen Raum von sechs auf zwei Positionen und entschieden uns, die Strategie früherer Manager gegen Beta zu wetten nicht weiter fortzuführen. Außerdem verkauften wir unsere Goldpositionen in Tranchen kurz vor und kurz nach der Präsidentenwahl in den USA. Aufgrund der wirtschaftlichen Auswirkungen von COVID-19 und dem Kopf an Kopf Rennen zwischen Biden und Trump hatte Gold an Wert zugelegt. Für den Fall, dass Trump die Wahl gewinnen sollte und die Märkte darauf unruhig reagieren würden, entschieden wir uns mit dem Verkauf der zweiten Tranche bis nach der Wahl zu warten.

Großteils jedoch folgte unser Investmentverhalten drei Strategien. Eine davon bestand darin, in saubere Energien zu investieren. Wir rechneten damit, dass Biden neuer US Präsident werden würde, was mit einer klimafreundlicheren Politik der USA einhergehen würde. Zudem intensivierte die EU während unserer Zeit als Manager ebenfalls ihre Klimaschutzvorgaben. Dazu kam, dass der Ausbruch der Pandemie bereits geplante Klimaschutzprojekte verzögerte, sodass wir von niedrigen Preisen profitieren konnten. Gegen Ende unseres Managerjahres entschieden wir uns zudem in Lithium zu investieren um von der stark wachsenden Nachfrage nach Elektrofahrzeugen zu profitieren.

Die zweite und wichtigste Strategie war unsere VIX Strategie mit der wir an unsere Recherchen aus unserem Analystenjahr angeknüpft haben. Die Strategie schlägt Kapital aus empirischen Merkmalen der VIX-Futures-Märkte, indem Long- oder Short-Positionen für den nächsten und übernächsten Monat aufgenommen werden. Die Position des nächsten Monats wird eröffnet, wenn der Unterschied zum Spot ausreichend groß ist, während gleichzeitig ein Future für das übernächste Monat mit entgegengesetzten Vorzeichen zur Absicherung eröffnet wird. Dabei wird ein Carry durch die Differenz der Konvergenzgeschwindigkeiten beider Positionen realisiert. Von neun ausgeführten VIX Deals generierten acht Gewinne. Insgesamt konnten wir auf diese Weise eine kumulierte annualisierte Rendite von 20,56 % oder 32.000 USD vor Steuern, aber nach Transaktionskosten, erwirtschaften.



Unsere FX-Carry-Strategie bildete die dritte Strategie. Zu Beginn unseres Managerjahres ließen wir diese Strategie ruhen, da wir Potential in der allgemeinen Volatilität der Finanzmärkte sahen, ein Umstand der der FX-Carry-Strategie nicht zuträglich ist. Später verfolgten wir eine einfache systematische Strategie bei der die drei Währungen mit der höchsten impliziten Rendite gegenüber dem US-Dollar gekauft werden. Die Strategie erwies sich als relativ erfolgreich.

Wir sind sehr stolz darauf, dass wir eine Gesamtrendite von 17,15% erwirtschaften konnten und damit weit über den angestrebten 9% liegen. Der Großteil der Gewinne wurde dabei zwischen November 2020 und März 2021 realisiert. Kurz vor der Portfolioübergabe mussten wir leider Verluste hinnehmen, die jedoch

durch unsere Investitionen in antizyklische Güter abgefedert wurden.

Unser Jahr als Manager war geprägt von den Nachwehen der Markteinbrüche durch den Ausbruch der Pandemie. Damit haben sich die Marktbedingungen in den letzten 12 Monaten grundlegend verändert.

Zusammenfassend lässt sich sagen, dass wir am Aufschwung nach der Krise gut partizipieren konnten. Es war möglich die Arbeit aus unserem Analystenjahr in die Praxis umzusetzen und unsere Ideen und Erwartungen im Portfolio zu implementieren. Die neue Situation erforderte eine mittelfristige Neuausrichtung und eine Anpassung an eine neue Phase im Konjunkturzyklus. Unsicherheiten, die zu Beginn unseres Managerjahres bestanden, wie z. B. die US-Wahl, lösten sich im Laufe des Jahres auf, aber neue Herausforderungen eröffneten sich: Nachdem die immanenten Auswirkungen der globalen Pandemie weiter zurückgehen, wird die Bewältigung ihrer Folgen einer der Haupttreiber der künftigen gesamtwirtschaftlichen Entwicklung sein.

Wir freuen uns, dass die neuen Manager viele unserer Strategien weiter umsetzen wollen, diese bereits mit eigenen Ideen verbessern und weiterentwickeln, aber auch eigene Ansätze verfolgen und wünschen ihnen dabei viel Erfolg. Die Pandemie hat gezeigt, dass gerade der persönliche Kontakt im akademischen Austausch, in anregenden Diskussionen und im gemeinsamen Teamwork wichtiger Bestandteil der PMP-Erfahrung ist. Ausgehend davon, dass sich die Situation weiter verbessert, hoffen wir, dass die neuen Manager im Rahmen des nächsten Jahres diese Erfahrungen teilen, ihr Wissen erweitern und als Team weiter wachsen können.

# Portfolio Management Program

2019 – 2021 • QUANT GROUP



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Stephan Kranner

31. MAY 2021

Der Anlageansatz der Quant Group konzentriert sich auf die Erfassung quantitativer Risikoprämien. Währen unserer Zeit im Programm haben wir diesen Ansatz auf verschiedene Anlageklassen und auf die Verwaltung eines ausgewogenen Multi-Asset-Portfolios ausgedehnt. Obwohl bestimmte Stilfaktor-Strategien und Anlageklassen vorherrschend waren, haben wir bewusst ein gut diversifiziertes Portfolio entwickelt und beibehalten, welches durch 'opportunistische' Trades komplementiert wurde und zu einer hohen Sharpe Ratio während unseres Managerjahres führte.

In Bezug auf Faktorinvestitionen hatten wir während des Jahres hohes Exposure

zu Quality, Size, Value und Carry. Unsere von ETFs vertretenen Aktienpositionen tendieren stark zu Quality, Size und Value, während die Wahl der festverzinslichen Positionen von Value und Carry bestimmt war. Die Devisenallokation baute auch auf dem Carry-Faktor auf, der durch eine NDF-Strategie erfasst wurde, die das empirische Versagen der ungedeckten Zinsparität nutzt.

Unser Managerjahr ist durch eine starke Performance gekennzeichnet, welche von sich erholenden Märkten und der Restrukturierung insbesondere unser Aktien-Positionen, die zusammen mit den Managern der vorherigen Kohorte getätigt wurde, profitierte.

Während des größten Teils unseres Managerjahres zeigte das Portfolio eine sehr positive Entwicklung. Im Rahmen unseres Anlagefokus, eine quantitative, langfristige und passive Strategie zu verfolgen, legten wir im Großteil des Jahres Wert darauf ein breit diversifiziertes Portfolio beizubehalten. Die strategischen Entscheidungen unserer Gruppe, im Rahmen unser Faktor-Timing-Strategie Faktor-ETFs zu rotieren und 'opportunistische' Trades auszuführen, erwies sich als erfolgreich und erzielte stabile Renditen bei geringer Volatilität. Exemplarisch lässt sich dies durch einen Vergleich der Performance des „iShares MSCI USA Quality Factor ETF", der von uns mit den vorherigen Managern verkauften Position, und des „iShares MSCI EMU Small Cap ETF", der von uns gekauften Position, beobachten. Der zweite Fonds übertraf den ersten im Laufe unseres Managerjahres um mehr als 20 Prozentpunkte.

Im Laufe des Managerjahres partizipierte das Quant-Portfolio an den positiven Entwicklungen der Kapitalmärkte, die durch den Glauben an eine schnelle wirtschaftliche Erholung in den entwickelten Ländern angetrieben wurde. Durch die Umstrukturierung unserer Aktienpositionen unter Berücksichtigung der Faktor-Timing-Strategie und der damit verbundenen Aufnahme des iShares Europe Value Factor ETF und des iShares EMU Small Cap ETF in unser Portfolio, die sich in Erholungsphasen am besten entwickeln, konnten wir sowohl von einer Erholung der Konjunktur als auch der Kapitalmärkte deutlich profitieren. Die Performance des Portfolios war daher das ganze Jahr über überwiegend positiv mit einem maximalen Rückgang von 5,76 % im Oktober, als die Corona-Virus-Fälle weltweit wieder anstiegen und die US-Wahl zu Unsicherheiten an den Märkten führte. Die Performance erreichte ihren Höhepunkt am 6. April mit einer Gesamtperformance von 17,75% seit Übergabe und bewegt sich seitdem seitwärts. Bei einer sehr niedrigen Stichprobenvolatilität von rund 5 % weist das Quant-Portfolio eine Zwölfmonats-Sharpe-Ratio von 2,19 auf.

Die Quant Gruppe ist mit der kumulierten Leistung von 17,60% am Ende des Managerjahres sehr zufrieden.

Im Vergleich zur früheren Kohorte haben wir in unserer Asset Allokation Aktien übergewichtet. Während die Vermögenswerte des Portfolios vor der Übernahme sehr ausgewogen war und insbesondere Anleihen von vorherigen Managern gekauft wurden, richtete unsere Gruppe

einen größeren Fokus auf Aktien, welche sich im Rahmen der Erholung der Kapitalmärkte besonders gut entwickelt haben. Grund hierfür war die Einschätzung, dass weite Teile der Wirtschaft durch aufgenommene Staatskredite in weiten Teilen der Welt finanziert werden würden, welche die Renditen nach oben treiben und Preise somit senken sollten. Ohnehin bot das internationale Niedrigzinsumfeld keine attraktive Anlagemöglichkeit, um die PMP Zielrendite von 9% zu erwirtschaften. Wir haben die von unseren früheren Managern festgelegte Rolling-Carry-Strategie fortgesetzt, sodass die Devisenallokation zeitweise zwischen 10% und 15% des verwalteten Vermögens lag. Als Reaktion auf die Erholung der Krise haben wir opportunistische Trades ausgeführt und unsere Cash-Position auf 12,2% der AuM reduziert.

Aufgrund der strategischen Entscheidungen, welche zusammen mit den vorherigen Managern im Rahmen des Ausbruches der COVID Pandemie getroffen wurden, unsere Aktienpositionen breit zu diversifizieren und dabei einen Fokus auf Europa zu setzen, wurde das Währungsrisiko zum USD auf 21% verringert. Deshalb konnten wir unter anderem von einem gegenüber dem USD aufgewerteten EUR profitieren. Wir hielten auch eine erhebliche Exposure zu TRY, UAH, MXN und RUB über Staatsanleihen.

Obwohl Aktien von vielen Marktteilnehmern als überbewertet eingestuft wurden, erwies sich diese Anlageklasse im Laufe unseres Managerjahres als sehr attraktiv. Insbesondere in Europa waren Risikoaktiva eine gute Wahl. Nach einem kleinen Rückgang im Oktober 2020, der durch die erneut steigende Anzahl an COVID-Fällen und die nahende US-Wahl verursacht wurde, legte unser Portfolio bis zur Übergabe um 17,5% zu. Somit erwies sich die Entscheidung der Quant-Gruppe, europäische Aktien überzugewichten, als richtig.

Die im Rahmen des Ausbruches der COVID-Pandemie getätigten opportunistischen Trades haben einen großen Anteil an der Portfolio Performance des Quant Portfolio. In letzter Zeit schwächeln aber insbesondere unsere Investments in China, wobei wir den neuen Managern eine Neubeurteilung der Lage nahelegen, ob eine Restrukturierung der Aktien-Positionen nun angemessen ist.

# Portfolio Management Program

2019 – 2021 • ZZ-ENTREPRENEURIAL GROUP



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TUTOR
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31. MAI 2021

Was für ein Jahr! So oder so ähnlich klänge wohl die im Rückblick treffendste Zusammenfassung unseres Managerjahres. Die dramatischsten Auswirkungen des Corona-Schocks im März 2020 konnten wir glücklicherweise noch vom Beifahrersitz aus beobachten, aber alsbald durften wir selbst ans Steuer. Es heißt, dass man in besonders turbulenten Zeiten am meisten lernen kann. Wenn die Tage an den Finanzmärkten von schlechten Nachrichten und Volatilität geprägt sind und die ehemals geltenden Regeln sich plötzlich als unzuverlässig erweisen und Panik und Irrationalität die Psyche der Marktteilnehmer und damit deren Entscheidungsfindung verzerrt. Wir hoffen in-

ständig, dass sich solch schwere, globale Pandemien auch zukünftig äußerst selten ereignen. Dennoch empfanden wir es als einmalig lehrreiche Erfahrung, das ZZ Portfolio während der COVID-Ära verwalten zu dürfen.

Während im letzten Jahr die Realwirtschaft und die Bevölkerung von Lockdowns und Existenzängsten bedroht war, hat sich der Nasdaq aufgrund skalierbarer Geschäftsmodelle und Homeoffice-Zwang mehr als verdoppelt. Für wesentliche Veränderung sorgten später im Jahr der Erfolg der Demokraten bei den Präsidentschaftswahlen in den USA und parallel sehr positive Entwicklungen auf Seiten der Impfstoffhersteller. In Kombination mit einer ultralockeren Geldpolitik und in ihrer Dimension ungekannten Stimulus-Paketen, haben die Märkte nach den vormals düsteren Prognosen schnell zu neuen Höhen gefunden. Im Rahmen dieses dynamischen Geschehens kam es außerdem zu Überraschungen und wahren Manien, wie es der Hype um die Gamestop-Aktie sowie das Wiedererwachen der Kryptowährungen rund um Elon Musks Twitteraktivitäten recht gut aufzeigen. Zuletzt ist dabei die Frage nach den zukünftigen Konsequenzen der Maßnahmen sowie die potenzielle Rückkehr der Inflation und damit einhergehend die Glaubwürdigkeit der FED in den Vordergrund gerückt, was ein sehr spannendes Jahr erwarten lässt.

Die beispiellosen Umstände der Pandemiewelt und der Anstieg der Nachfrage nach US-Dollar zu Beginn der Pandemie in der westlichen Welt offenbarten die Fragilität der Carry-Prämie. Die darauffolgenden geldpolitischen Interventionen haben in den Industrieländern sowie in einigen Schwellenländern zu Zinssätzen von 0% geführt, was sich negativ auf unsere FI- und FX-Strategie auswirkte. In diesem Sinne war der unternehmerische Ansatz der ZZ Strategie für uns besonders vorteilhaft, da er unser Anlageuniversum vergrößerte, als Preisverzerrungen über alle Märkte und Anlageklassen hinweg zu beobachten waren. Die taktische Umstrukturierung des Portfolios hin zu einer ausgewogeneren Allokation erfolgte zugunsten von Aktien und vor dem Hintergrund der laufenden fundamentalen makroökonomischen Bewegungen sowie in Erwartung einer Phase des Wachstums. Konkret profitierten wir sehr von einigen eher ZZ-untypischen Positionen wie europäischen und US-Aktien sowie alternativen Investments wie Immobilien, Rohstoffen und Dividenden-Futures, darüber hinaus aber auch von Kernmärkten wie Mexiko. Um die Veränderungen zu realisieren, haben wir vor allem Bestände reduziert, die eine schwache Performance in Verbindung mit schlechten Zukunftsaussichten aufwiesen. Unser Fokus lag dabei auf den zuvor übergewichteten Türkei-Anleihen, welche aufgrund der Pandemie und unerwarteten geldpolitischen Maßnahmen zu signifikanten Verlusten führten.

Rückblickend brauchten wir leider mehr Zeit als nötig, um das Portfolio an den Paradigmenwechsel anzupassen und die notwendigen Änderungen vorzunehmen, was sich letztlich auch nachteilig auf unsere Performance auswirkte. Daraus haben wir gelernt, dass der Markt de-

finitiv nicht auf die Unentschlossenen wartet. Eine proaktive Meinungsbildung und ein darauffolgendes, konsequentes Handeln stellen wesentliche Treiber erfolgreicher Investments dar und mangelnde Entscheidungswilligkeit zieht schnell größere Konsequenzen nach sich, als manchmal eine falsche Entscheidung zu treffen. Wir sind daher sehr froh, dass die Restrukturierung zu einer positiven Jahresperformance von 0,41% beigetragen hat und wir ein gut diversifiziertes, widerstandsfähiges Portfolio übergeben. Nichtsdestotrotz wird das kommende Jahr einiges von den neuen Managern abverlangen und aufgrund der Dynamik der aktuellen Situation ein aktives Hinterfragen und Bewerten des Portfolios erfordern. Unserer Meinung nach sind die Inflation in den westlichen Volkswirtschaften bzw. den USA sowie die Rolle des US-Dollars die wichtigsten Einflussfaktoren hinsichtlich der Zusammensetzung des Portfolios für das nächste Jahr.



Das von uns erlebte Marktumfeld erforderte es, laufend eine große Unbekannte miteinzubeziehen und Überzeugungen und gefühlte Wahrheiten zu hinterfragen. Während die meisten von uns das PMP mit einer gewissen Vorliebe für Aktien begonnen haben, stand stets im Fokus darauf aufzubauen und durch vielseitige Eindrücke ein ganzheitliches Verständnis von Märkten und Investments zu entwickeln. Dies wurde durch die exzellente akademische Begleitung, die vielen spannenden Expertenvorträge und nicht zuletzt den Diskurs mit unseren Kollegen*innen und allen Unterstützenden mehr als erreicht. Besonderer Dank gilt dabei unserem fantastischen Tutor Richard Boulanger, der uns jederzeit mit Rat und Tat zur Seite stand und uns mit unzähligen Ratschlägen versorgte und unser Verständnis der ZZ Strategie entscheidend prägte. Wir sind absolut überzeugt, dass wir dank des gesammelten Erfahrungsschatzes sehr viel besser auf zukünftige Krisensituationen an den Märkten vorbereitet sind und gezielter reagieren können. Auch wenn wir den gesamten Wert der vergangenen zwei Jahre vermutlich erst Stück für Stück begreifen werden, sind wir schon jetzt sicher, dass wir in jeder Hinsicht über uns hinausgewachsen sind und selbstbewusst und voller Wissen nach vorne blicken können.

# Portfolio Management Program

2020 – 2021 ◆ ACADEMIA MACRO FINANCE GROUP



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31. MAI 2021

Das vergangene Jahr war wohl wie kein anderes im letzten Jahrzehnt geprägt von ökonomischer und gesellschaftlicher Unsicherheit. Diese Unsicherheit spiegelte sich auch auf den Kapitalmärkten wider. Wir, die Analysten der Academia Macro-Finance Gruppe, beneiden jedoch nicht unsere Vorgänger, sondern sehen diese Phase als Chance, kurzfristig hohe Renditen zu erwirtschaften, sowie Bewertungskorrekturen für eine strategische Positionierung in diversen Asset-Klassen zu nutzen. In diesem Bericht erläutern wir ausgewählte Positionen, um einen Einblick in unsere grundlegende Strategie zu gewähren, sowie unsere Stoßrichtung für das kommende Jahr zu definieren.

Dieser Bericht ist zweigeteilt, einerseits wollen wir im ersten Teil neue Positio-

nen erörtern, welche aufgrund langfristiger makroökonomischer Dynamiken für uns attraktiv erschienen. Der zweite Teil betont einen weiteren Aspekt der Investmentstrategie unsere Gruppe, eine systematische Strategie, welche bereits von unseren Managern implementiert und von uns weiterentwickelt wurde und uns dienliche Eigenschaften von Futures auf den CBOE Volatility Index (VIX) verwendet. Wir sehen in der Kombination von systematischen und makroökonomischen Strategien ein vielversprechendes Konzept für unser Portfolio.

Ein wohl nicht mehr verschwindendes und immer wichtiger werdendes Thema für institutionelle sowie private Anleger sehen wir im Bereich des nachhaltigen Investments. Obwohl wir kritisch gegenüber den Konzepten diverser Ratingagenturen in diesem Bereich stehen, lässt sich nicht verneinen, dass „grünere" Investments positive Eigenschaften besitzen (u.a. in Albuquerque et al. (2020) oder Lins et al. (2017)). Unser Augenmerk fiel auf den Bereich erneuerbare Energien, aufgrund eines weltweit beobachtbaren politischen Push in diese Richtung. Auf der wirtschaftlichen Seite vermerkte die International Energy Agency (IEA) vor kurzem, dass die Hälfte aller 2019 neu-hinzugefügter nachhaltiger Energieerzeugungskapazität billiger ist, als das günstigste Kohlekraftwerk erzeugen könnte. Dies spiegelt einen Trend zu einer wesentlich preiswerteren Kostenstruktur in allen Bereichen der erneuerbaren Energien wider. Wir erwarten eine ähnliche Entwicklung in den kommenden Jahren, aufgrund sich schnell entwickelnder Technologien sowie einem stärkeren Engagement Richtung Ausstieg aus fossilen Energiequellen von westlichen Staaten.

Eine ähnliche Stoßrichtung sehen wir bei unserem nächsten Themenblock. Es sollte wohl nicht verborgen geblieben sein, dass alle großen Kraftfahrzeughersteller in den letzten Jahren stark auf das Thema Elektrifizierung aufspringen. Ein natürlicher Prozess, nachdem einige Staaten weltweit ein langsames Verbot von Verbrennungsmotoren angekündigt haben (u.a. Kanada, Dänemark, Israel und Norwegen). Obwohl hierbei noch die treibenden Märkte (USA, Deutschland und China) in diesem Bereich fehlen, gibt es auch in diesen Ländern eine klare Entwicklung hin zu Elektrifizierung des Transports. Die vorherrschende Technologie für PKWs sowie leichte Transporter basiert auf Lithium-Ionen-Batterien, welche signifikante Vorteile gegenüber anderen Technologien in diesem Bereich aufweisen. Die Finanznachrichtenagentur Bloomberg errechnet, dass der Markt für Elektroautos sich bis 2040 um den Faktor 20 vergrößern wird und miteinhergehend die Nachfrage für Lithium-Ionen-Batterien sehr stark ansteigen wird. In Verbindung mit einem geringen Preis für Lithium in diesem Jahr, einem prognostizierten Anstieg der Nachfrage und gleichbleibendem Angebot, sehen wir starkes Wachstumspotential in diesem Bereich.

Unsere Manager implementierten in ihrem zweiten Jahr eine sehr attraktive Strategie (basierend auf Simon und Campasano (2012)), welche die Eigenschaft ausnutzt, dass die Basis von Ter-

minkontrakten auf den VIX und der VIX selbst nicht das VIX-Niveau, jedoch die Terminkontrakte vorhersagen kann. Wie im letztjährigen Bericht schon vorgestellt, ist dies eine hochprofitable Strategie mit der gleichzeitigen Eigenschaft für unser Portfolio, uns gegen Risiken auf den Aktienmärkten abzusichern. Wir, als Analysten, wollen diese Strategie selbstredend weiterführen und versuchen, diese auch weiterzuentwickeln. So experimentierten wir mit verschiedenen Implementierungs- bzw. Absicherungsstrategien, um Sharpe Ratio und Performance zu optimieren. Jedoch wohl die wichtigste Eigenschaft liegt in der negativen Korrelation zu unserem Portfolio in Phasen von negativen Entwicklungen auf den Aktienmärkten. Die zugehörigen Backtests können in unserem eigentlichen Bericht nachgeschlagen werden.

# Portfolio Management Program

2020 – 2021 • QUANT GROUP



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31. MAI 2021

Um das zentrale Thema des Factor Investings der Quant Group bestmöglich umzusetzen, liegt das Hauptaugenmerk der Quant-Analysten auf diversen Faktorprämien. Dabei stellt sich die Frage: Wann erwirtschaften welche Faktorprämien signifikante Renditen und wie hoch sollte das „Exposure" unseres Porfolios insgesamt sein?

Die Beantwortung dieser Frage war nicht nur geprägt durch Lesen und Analysieren von wissenschaftlichen Artikeln, sondern auch durch Replizieren und „Backtesten" von Investmentstrategien. Im Vordergrund dieser Analysen stand unter anderem ein Factor Timing Model für Equity, basierend auf dem Paper „Factor Timing with Cross-Sectional and Time-Series Predictors" (2017) von

Hodges et. al.. Dieses Paper versucht die Frage zu beantworten, welche Faktorprämien bzw. welche Smart-Beta Strategien in welchen Konjunkturphasen am rentabelsten sind. Im Fokus stehen dabei „Value", „Size", „Momentum", „Quality" und „Minimum-Volatility". Voraussetzung für diese Analyse ist natürlich zu erörtern, in welcher Phase der Konjunktur wir uns gerade befinden, um unsere Investitionen bestmöglich zu timen.

Um herauszufinden, bis zu welchem Grad die Quant-Analysten diese Strategie implementieren sollen, um das bestmögliche Ergebnis zu erlangen, widmeten sie sich dem Thema „Exposure Management". Die wissenschaftlichen Artikel „Volatility-Managed Portfolios" (2016) von Alan Moreira und Tyler Muir und „What is the Expected Return on the Market" (2016) von Ian Martin, bearbeiten genau dieses Thema, nämlich wie hoch das „Exposure" eines Portfolios insgesamt sein soll. Obwohl beide Artikel unterschiedliche Methoden und Ergebnisse dieses Problems erarbeiten, ist der Ansatz gleich: Prognostizieren des Equity Premiums auf Basis von Volatilität der Märkte. Moreira und Muir (2016) stellten in ihrem Paper eine Strategie vor, die Portfolios auf Basis der historischen Volatilität managt. Der Grundsatz dabei ist, das „Exposure" zu erhöhen, wenn die historische Volatilität gering ist und vice versa. Dabei zeigten die Autoren, dass man mit diesen sogenannten Volatility-Managed Portfolios signifikante Alphas und hohe Sharpe Ratios generieren kann. Um diese Strategie (vor allem im Kontext des Quant-Portfolios) zu testen, programmierten die Quant-Analysten einen Algorithmus, der diese Strategie für jegliche Portfolios oder Indexe testen kann. Um die Strategie für das Portfolio Management Program realisierbar zu machen, erlaubt der Algorithmus „Exposures" im Bereich 80% bis 120%. Auffällig bei unseren Backtests war, dass diese Strategie nicht in jedem Markt besser war, als der Markt an sich. Speziell im amerikanischen Markt war die Strategie von Moreira und Muir (2016) besonders rentabel, was ein Zeichen für „Overfitting" sein könnte.

Um das Konzept des Managements auf Basis von Volatilität noch weiter zu optimieren, lag der Fokus ebenfalls auf implizierter Volatilität. Martin (2016) errechnet mittels implizierter Volatilität von Optionen einen unteren Grenzwert für das Equity Risk Premium (SVIX). Dies erregte speziell die Aufmerksamkeit der Analysten, da das Ergebnis konträr zu dem von Moreira und Muir (2016) ist. Martin (2016) argumentiert, dass dieser untere Grenzwert in Krisenzeiten, und somit bei hoher Volatilität der Märkte, signifikant höher ist, als wenn der Markt nur geringe implizite Volatilität aufweist. Martin (2016) veranschaulicht dies unter anderem mittels einer market-timing Strategie des S&P 500, die in den Jahren von 1996 und 2012 eine erheblich bessere Performance aufweist als der Markt an sich. Weiters legt Martin (2016) dar, dass man dies auch nutzen kann, um die Wahrscheinlichkeit eines drastischen Kurssturzes vorherzusagen.

Ziel der weiterführenden Analyse der Quant-Analysten bzw. kommenden Portfoliomanager ist es, die Strategien der

erwähnten Artikel zu optimieren und zu kombinieren. Die Kombination der historischen und impliziten Volatilität, um das optimale „Exposure“ und darauffolgend die optimale Allokation zwischen den Faktorprämien zu errechnen, wird einer der zentralen Bestandteile der Strategie der Quant-Gruppe.

# Portfolio Management Program

2020 – 2021 • ZZ-ENTREPRENEURIAL GROUP



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31. MAI 2021

Ab Mai 2021 liegt ein wesentlicher Teil unserer Portfoliopositionen in festverzinslichen Positionen in Schwellenländern. Unser mittelfristiger Ausblick für Staatsanleihen der Schwellenländer ist jedoch im Allgemeinen nicht positiv, da die Verschleppung von Lockdowns, anhaltende Spitzen bei COVID-Infektionen und die Angst vor einer längerfristigen Inflation in den USA, die zu einer Drosselung des aktuellen Anleihekaufprogramms der Federal Reserve führen könnte, die Unsicherheit in Bezug auf das kurzfristige Wachstum dieser Volkswirtschaften erhöhen.

Aus den oben genannten Gründen haben wir gezögert, das festverzinsliche Engagement unseres Portfolios zu erhöhen. Stattdessen entschieden wir uns, einen

gezielteren Ansatz in unterbewertete Schwellenländeraktien zu implementieren, was die Notwendigkeit zur Entwicklung des CAPE-Tools motivierte. Die Grundlage für unser Projekt war die Tatsache, dass wir etwas für die zukünftigen Kohorten hinterlassen wollten, indem wir ein wertvolles quantitatives Tool geschaffen haben, das wir auch in der ZZ Knowledge Base zur Verfügung stellen werden.

Das Modell ist in der Programmiersprache R geschrieben und extrahiert drei Paneldatensätze aus dem Bloomberg Terminal. Es liefert dann als Ausgabe seine prognostizierten annualisierten 10-Jahres-Gesamtrenditen für 41 verschiedene Aktienindizes, von denen jeder ein anderes Land oder eine andere geografische Region widerspiegelt. Jeder Aktienindex ist so gewählt, dass er die Unternehmen enthält, die den größten Teil des Handels und der Marktkapitalisierung in der jeweiligen Region ausmachen, während er auch Firmen aus verschiedenen Sektoren enthält, die für die lokale Wirtschaft wichtig sind.

Der Zeitraum der Daten für jeden Aktienindex ist aufgrund der Datenverfügbarkeit unterschiedlich und reicht für die USA bis ins Jahr 1849 zurück und endet für jeden Aktienindex im Februar 2021. Um die Prognoseleistung des Modells zu testen, unterteilten wir den kompletten Datensatz in einen In-Sample-Zeitraum, der für die anfängliche Parameterschätzung sowie die Modellauswahl verwendet wird, und einen Out-of-Sample-Zeitraum. Wir legen den In-Sample-Zeitraum auf die zehn Jahre zwischen 2001 und 2011 fest. Wir stellten fest, dass die Standardversion unseres Modells Renditen vorhersagte, die innerhalb von 2 % der tatsächlich realisierten Renditen über das folgende Jahrzehnt für 66 % der Regionen im Modell lagen. Abbildung 1 auf der nächsten Seite zeigt einen Vergleich der vorhergesagten mit den realisierten Renditen für jede Region.

Wir verwenden Standardfehler, die robust für Heteroskedastizität sind und erhalten immer noch eine aussagekräftige Beta-Koeffizientenschätzung für 40 von 41 Regionen. Darüber hinaus stellen wir fest, dass es eine Autokorrelation der Regressionsresiduen gibt, und korrigieren dies, indem wir eine verzögerte Version der Antwortvariable als Regressor einbeziehen. Wir stellen fest, dass dies die Vorhersagekraft unseres Modells verbessert.

In Zukunft beabsichtigen wir, die Genauigkeit unseres Modells zu verbessern, indem wir die so genannte Exzess-CAPE-Rendite von Shiller einbeziehen. Diese Metrik berücksichtigt bei der Vorhersage von Aktienrenditen auch die Rendite von lokalen Staatsanleihen. Anleiherenditen sind von Bedeutung, wenn es darum geht, zu beurteilen, welcher Aktienmarkt überbewertet sein könnte, da die Finanztheorie vorhersagt, dass Investoren von festverzinslichen Wertpapieren zu Aktien wechseln, wenn die Anleiherenditen für Fondsmanager viel zu niedrig sind, um ihre Zielrenditen effektiv zu erreichen. Wir finden, dass diese Verbesserung in einer Zeit wie jetzt, in der die realen Anleiherenditen in Märkten wie den Vereinigten Staaten unter Null gefallen sind, sehr relevant ist.

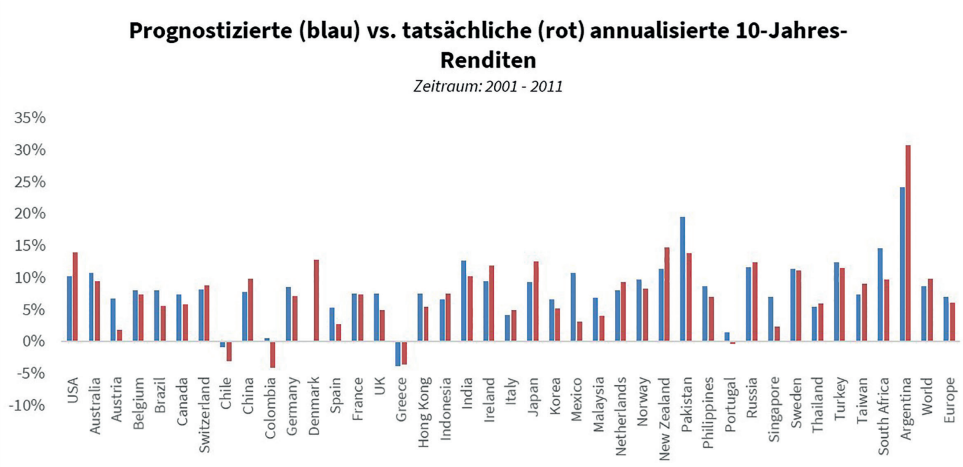
Prognostizierte (blau) vs. tatsächliche (rot) annualisierte 10-Jahres-Renditen
Zeitraum: 2001 - 2011
35%
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
USA
Australia
Austria
Belgium
Brazil
Canada
Switzerland
Chile
China
Colombia
Germany
Denmark
Spain
France
UK
Greece
Hong Kong
Indonesia
India
Ireland
Italy
Japan
Korea
Mexico
Malaysia
Netherlands
Norway
New Zealand
Pakistan
Philippines
Portugal
Russia
Singapore
Sweden
Thailand
Turkey
Taiwan
South Africa
Argentina
World
Europe

ABBILDUNG I

MANAGER REPORT

# Academia Macro Finance Group



COHORT 17

# Portfolio Management Program

2019 – 2021 • ACADEMIA MACRO FINANCE GROUP



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MAY 31ST, 2021

## I. STRATEGY AND APPROACH OF THE GROUP

The Academia Macro-Finance Group puts emphasis on the analysis of cyclical macroeconomic dynamics. Our developed strategies are backed with theoretical findings and empirical evidence on investment decisions provided by recent academic literature.

We took over the portfolio shortly after the market bottomed out in the wake of the COVID crisis. As a consequence of expected market recovery, we decided to deviate from the asset allocation targeted by our previous managers in favor of equity. The first step was optimizing the existing portfolio: We restructured our expo-

sure in Asia from six to two positions and thus decided against the previously pursued betting against beta strategy since it did not appear to be a viable investment option at the time. In a further step, we sold our gold position in tranches. Our gold position helped us hedge during the crisis, but we did not expect any significant increase in value following the initial market downturn. Next, we exited a poorly performing and expensive actively managed emerging markets fixed income position. We replaced it with an EM fixed income position with lower fees and that did not offer dividends so we could still keep our exposure to emerging markets.

To further grasp market recovery opportunities, we increased our equity position by adding exposure to small-cap stocks through our purchase of Xtrackers Russel 2000 ETF. During the crisis, firms with small-cap stocks suffered the most due to their higher sensitivity to the economy. Our portfolio's initial low small-cap to large-cap position ratio strengthened us in our decision. Moreover, the relatively higher personal savings rate provided strong support for greater future consumption.

Leading up to the US presidential election in November 2020, US presidential candidate Joe Biden was listed in polls as having a higher possibility of winning the presidency. As a response to his campaigning stance on clean energy and climate change initiatives, we chose to enter the clean energy market before the election. We reasoned that the US government would become an essential player in the clean energy market, making the market more attractive to firms and investors. Besides, the EU had set more policies regarding clean energy. Hence, growth has not been fully priced in. Furthermore, when we gained our exposure in the market, governments had been delaying their execution in clean energy policies due to the COVID-19 surrounding. Hence, our clean energy market position could also benefit from the relatively low price. Also, we later gained exposure to lithium due to the rising awareness of climate change and the increasing demand for the material for electric vehicles.

During our manager year we implemented two systematic trading strategies, the VIX strategy and the FX strategy. Trading the VIX term structure is a continuation of our research and work we carried out in our analyst year. The strategy exploits empirical characteristics of the VIX futures market by taking long or short positions in the first-nearby and second-nearby monthly futures contracts. The first-nearby position is opened if the difference to the spot is sufficiently large, while simultaneously the second-nearby future of opposite direction is opened to hedge against adverse movement in the term structure. A carry return is generated by the difference in convergence speeds of both positions.

As to the FX strategy, we improved our previous managers' work to trade one-month FX NDFs and forwards. We implemented a pure basis strategy after observing in our backtests that momentum has not performed well since 2013. Basis is defined by the cost-of-carry relationship between the forwards and spots. Theoretically, it captures the information about fu-

ture spot risk premium and the cash yield — it is a powerful predictor of the future spot risk premia. In the strategy, we long three local currencies that have the lowest basis (highest implied yield) among the 30 currencies in our universe, including DM and EM, and short USD with equal weight. The FX strategy accounted for 20% AuM and of the four trades, three have ended in a profit since its start in November 2020. However, there is some room for improvement; adding fundamental reasoning to support the strategy could overcome some drawdowns.

## 2. PORTFOLIO PERFORMANCE

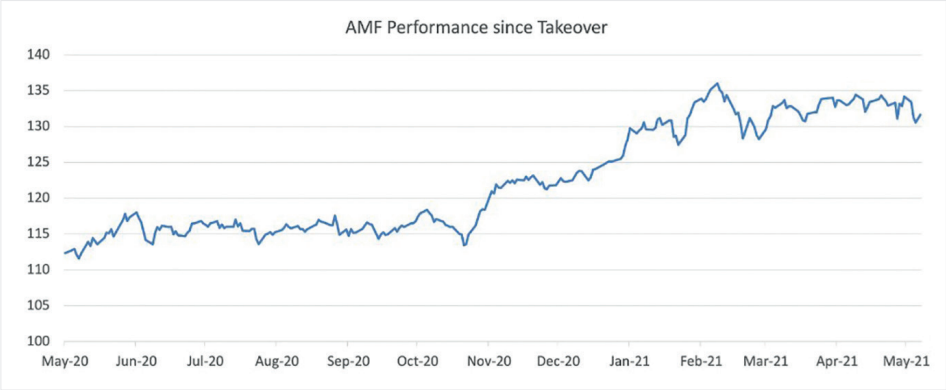
### 2.1. OVERALL PERFORMANCE



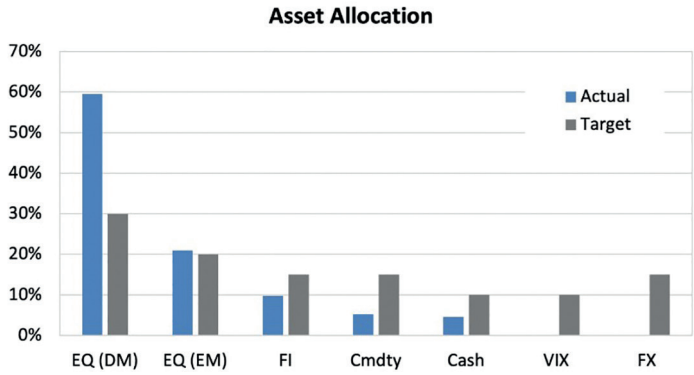
Overall, our portfolio ended with an impressive positive performance of 17.15%. This is well above the program's 9% goal and 24.37% greater than our previous managers' end performance. Adding to our growing gains since takeover, we enjoyed the majority of our positive performance from November 2020 through March 2021. It is worth noting that a few weeks before handing over the portfolio we reached a peak performance since takeover of 19.68% in mid-April. However, as almost 27% of our portfolio is exposed to Asia as well as having new energy and small-cap positions, we experienced a drawdown in this peak performance right before the new managers' takeover. Despite this drop in performance we were cushioned by having kept some of our anti-cyclical positions. We are leaving the portfolio in a completely different investment environment than the one we started. While we started our manager year with a value at risk of 158,878 EUR and a negative Sharpe ratio, we are finishing our manager year with a value at risk of 64,384 EUR and with a Sharpe ratio of 1.28.

### 2.2. ASSET ALLOCATION

Having initially obtained the portfolio with conservative anti-cyclical positions in a rallying market, we began our man-




PORTFOLIO PERFORMANCE 05/2020–05/2021




ASSET ALLOCATION COMPARISON 05/2020 AND 05/2021

ager year by consolidating and updating our asset allocation to put more weight in equities and less weight in fixed income. The previous managers had a target asset allocation of 26% fixed income, 55% equity (32% DM and 23% EM), 15% commodities, 4% cash, and 15% FX. We wanted to incorporate our group's VIX strategy into this mix and decided on the following new asset allocation that seemed appropriate for the high volatility and bullish market environment: 15% fixed income, 50% equity (30% DM and 20% EM), 15% commodities, 10% cash, 10% FX, and 15% VIX. However, near the end of our manager year we moved to hold only a 5% cash position so that we could add exposure to lithium through a battery solutions ETF and closed out our FX and VIX positions. We ultimately will hand our portfolio over to the new managers with roughly the following allocation: 10% fixed income, 81.5% equity (60.5% DM and 21% EM), 5% commodities, 5% cash, 0% FX, and 0% VIX. Although this is not listed as its own asset class, the large equity position is also due to our group trying to incorporate more green energy and ESG stocks into our portfolio; these specific positions make up about 12% of the exposure.

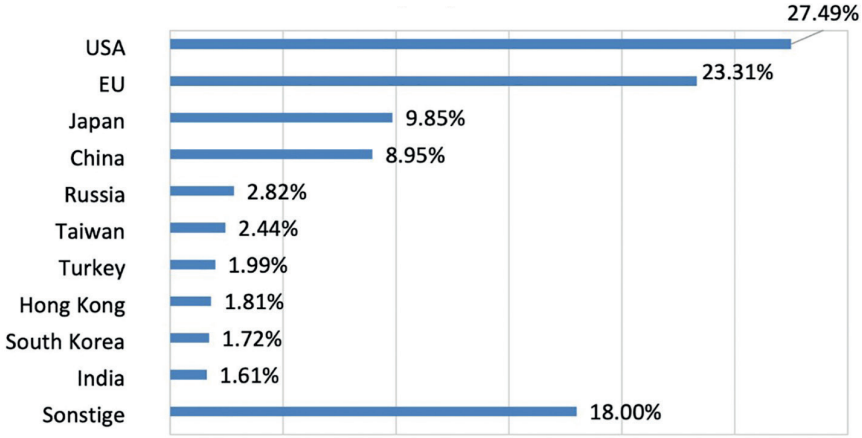


### 2.3. EXPOSURE

Throughout most of our manager year, we actively followed our systematic trading strategies for FX and VIX. We often utilized the full risk budget we were allotted for the VIX futures contracts and the FX forwards/NDFs. This often brought us to an overall exposure ranging between 120 and 130%. Our currency and country exposure remains relatively similar to each other. Our greatest country and currency exposure is in the US (27.45%), while our second greatest regional exposure is in Asia (26.38%) and our third greatest in the EU (23.31%).

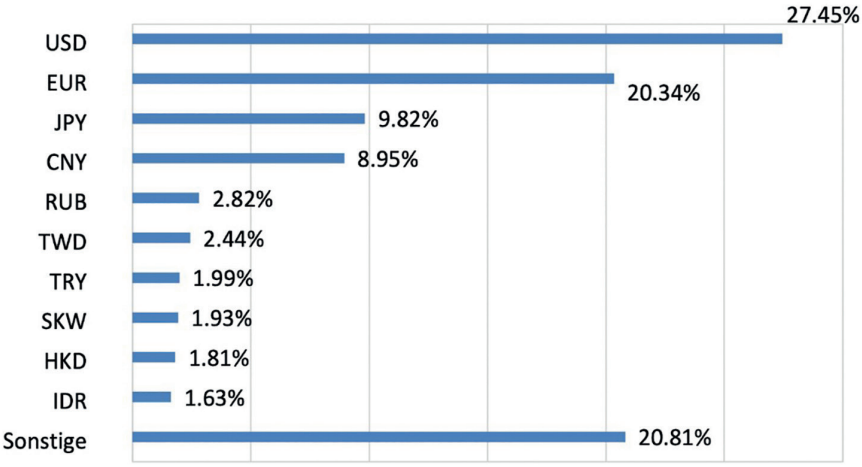
## 3. MARKET CONDITIONS THROUGHOUT THE YEAR

When we took over the AMF portfolio in May 2020, the world economy faced an




COUNTRY ALLOCATION 05/2021






CURRENCY ALLOCATION 05/2021

unprecedented crisis. The crash in the stock markets in February and March hit our group hard and we had problems profiting from the recovery in April. In response to this, our first decision as new managers was to shift exposure from bonds to equity for two reasons. Firstly, equity was cheap because of lower earnings as well as a high amount of uncertainty. During times of uncertainty taking risk earns the highest premium. Secondly, the already low interest rates were cut further all over the world because of worldwide massive monetary stimulus packages. This made it unattractive to hold bonds. When buying equity in the summer of 2020, we focused on value stocks because their recovery lagged, whereas tech stocks had already surpassed their all-time highs.

The main event in fall 2020 was the US presidential election. Until the end it was not clear who would win. Although Joe Biden led in all polls, the market was nervous about Donald Trump winning a second term. In the 2016 election, the polls had inaccurately predicted the democratic frontrunner as the clear winner. Therefore, the markets observed high volatility and low equity prices. This uncertain environment led to a rally in the gold price, which already had an outstanding performance because of the COVID-19 crisis. We took the chance to sell gold with the clear intention to buy it back as soon as the world economy stabilized. Our group believed in a democratic victory and therefore we invested into equity from the clean energy sector. This was one of the best performing sectors from November to January.

By the end of January 2021, the rally in global equity across all sectors was over. The main reason was the fear of rising inflation and subsequently interest rates. The sectors that suffered most were among those with the best performance in 2020: the so-called "COVID-19 winners" like big tech companies, clean energy or hydrogen firms. The sector that profited most from rising interest rate expectations was the banking industry, which also presented strong earnings that beat consensus. We also observed a disappointment in the markets because of the slow vaccination speed and continuously extended lockdowns in Europe.

In the spring of 2021, there was low volatility in the markets, but we did not see a uniform direction. Also, the end of many lockdowns and rising vaccination coverage in Europe and the US did not lead to a bull market, because the return to normality in summer was already priced in.



## 4. INVESTMENT BEHAVIOUR BY ASSET CLASS

### 4.1. FIXED INCOME

Our fixed income strategy was quite simple: Reduce in favor of equities. In accordance we sold off non-performing positions but rotated one new position into the portfolio, a local currency EM debt fund where it was our belief that the addition of an exchange rate risk premium made the overall expected return attractive.

### 4.2. GOLD

We viewed gold as an interesting asset (in a portfolio context) for its empirical characteristic to hedge very sudden drawdowns in other financial markets through a safe haven effect of investors forgoing risky assets and piling into gold. Despite this, we saw the potential for a large and sudden drawdown as rather low. Therefore, we liquidated half of our gold position before the 2020 US elections and the other half after an unfavourable election result would mean potential risk to the markets and our portfolio.

### 4.3. EQUITIES



Equities were our preferred asset class for the year. Accordingly, we used spare cash and parts of the fixed income allocation to increase our allocation to equities. The selection of the individual positions was based on a discretionary approach.

We followed two broad ideas here:

1. Buy pockets of the market that are (in our eyes) attractively valued on a relative basis, for example, because valuations had not recovered as quickly as the general market. The prime example of this idea being the inclusion of the S&P Dividend Aristocrat Index, which at the time of inclusion showed a very attractive aggregate dividend yield.

2. Buy parts of the market that we viewed as positioned for profiting from secular trends. Our restructuring of our Asian equity positions, which increased the exposure to China, followed this rationale, as we see the Asian region as one of the most important, if not the most important, drivers of future global GDP growth. Additionally, our positions in new energy/battery technology stocks has to be thought of in this strategy context, where the underlying trend is a generally recognized need for the world to reduce its greenhouse gas emissions in addition to (anticipated) incentives and policies from many developed market governments that have made this their stated goal. The positions bought for this rationale have unfortunately underperformed recently as they include significant exposure to technology companies, but it is our continued belief that they will remain attractive over the long-term.

### 4.4. FX

We held off on trading our FX carry strategy for the first months of our manager year, as non-treasury carry strategies are negatively exposed to general financial market volatility. We saw this as a potential risk. After that we followed a simple systematic strategy that bought the three currencies with the lowest basis (highest implied yield), against the US dollar. The strategy proved relatively successful with some losses when TRY exchange rates moved against us in late February/March.

### 4.5. VOLATILITY

This asset class is represented in our portfolio through our VIX futures strategy. We trade calendar spreads, long or short depending on the shape of the fu-

tures curve. With this we harvested a risk premium for selling insurance against volatility in the short-term, while buying ourselves insurance against volatility in the short-to-medium term.

After the large volatility spike during the corona crash of 2020, the demand for such insurance (either through direct demand for VIX calls, or indirect demand through S&P 500 puts) was high, meaning the risk premium we harvested was quite large.

However, the strategy is not always on the selling side of the trade. For example, we bought the front month contract and sold the second month contract during the run-up to the US elections where the general unease and uncertainty around the results had strongly increased VIX futures demand in the front end of the curve. After the uneventful resolution of this uncertainty we of course paid the price for having held insurance against an unfavourable outcome and realised the only loss within the 9 trades made during the strategy implementation.

That is not to say that there were not other difficult times for the strategy. Early September saw an episode of a "spot up vol up"-dynamic driven by speculative retail demand for short dated call options and the resulting dealer net gamma positioning. Both implied volatility as well as the prices of the underlying went up. As the calendar spread hedges out level risk without being exposed to this correlation risk we fared well during this period and made a nice profit, but nonetheless had to close out the trade early.

Additionally, there were quite painful times early on in 2021 when retail speculation on a few stocks pushed the implied (and to some extent realized) volatilities on these into, frankly, unreasonable territories. Despite these stocks being of small capitalization and not included in the S&P 500, they had effects on the S&P 500 options markets and thus of course on the VIX. In the end of January our position was also caught up in the volatility spike, leading to large intra-day losses. It was our firm conviction that this cross-effect onto the S&P 500 options market was technical and highly transitory, so we overrode the systematic signal on this occasion and held the position. This decision netted us the most profitable trade in the strategy at 5.7% over the course of just a few days, for an annualized return of 83%.

Overall the strategy generated a cumulative annualized return of 20.56% with remarkably low volatility and a total contribution to the portfolio of almost USD 32,000 (before tax but after transaction costs).

## 5. CONCLUSION, OUTLOOK, AND TIPS FOR THE ANALYSTS

In summary, we were well able to anticipate the upswing following the crisis that manifested itself in the spring of 2020. We were able to put the work from our analyst year into practice and implement our ideas and expectations in the portfolio. The new situation required a medium-term reorientation and an adjustment to a new phase in the economic cycle. Uncertainty that existed at the

beginning of our manager year, for example, the US election, dissipated in the course of it, but new challenges opened up. Now that the immanent effects of the global pandemic are further receding, dealing with its consequences will be one of the main drivers of macroeconomic developments in the future.

We are pleased that the new managers want to continue implementing our strategies, improve and develop them with their own ideas, but also pursue their own approaches. We wish them every success in doing so. The pandemic has shown that academic exchange, stimulating discussions and excellent teamwork in-person are important parts of the PMP experience. We wish the new managers that, as the situation continues to ease, they will also be able to share this experience and further grow together as a team.

MANAGER REPORT

# Quant Group



COHORT 17

# Portfolio Management Program

2019 – 2021 • QUANT GROUP



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MAY 31ST, 2021

## I. STRATEGY

The Quant Group's investment approach focuses on capturing quantitative risk premia. While our approach has been mainly quantitative, we have always kept our guiding principles in mind and used the extraordinary market conditions due to the Corona pandemic to execute opportunistic trades. However, we were consciously focused on developing and containing a well-diversified portfolio and thereby following long-term investments and ideas backed by academic literature which ultimately led to a high Sharpe ratio and to an outstanding performance throughout the year.

The previous managers followed in most parts a successful buy and hold strategy based on long-held assets from previous cohorts, complemented by a newly implemented factor timing strategy. The group's main investment style targets – value, momentum, quality, size and carry – were represented by certain securities, mainly ETFs and fixed income instruments. To further emphasize the aspect of quantitative investing and to continue a well-working strategy of the two previous cohorts, we decided to harvest quantitative risk premia via NDFs. As the factor timing strategy is the core strategy in our investment orientation, and previous managers focused on fewer factors, we opted to supplement these with further risk premia that are discussed in academic literature. A brief outline of the factors that we focus on is stated below:

VALUE. Equities with higher book-to-market ratios and earnings yields have yielded higher returns than the market and growth stocks over many decades. A potential behavioral explanation for this phenomenon is that earnings growth mean-reverts faster than the market expects. Hence, growth firms with inflated expectations are more likely to disappoint. Our strategy regarding value is consequently, to buy stocks that exert certain value characteristics. This strategy is implemented via an ETF.

MOMENTUM. In addition to value, we also follow a momentum strategy, which is also implemented via an ETF which purchases stocks that exert momentum characteristics. This strategy is based on a finding from the early 1990s that found a short to medium-term momentum effect. Equities that had outperformed in recent months typically keep outperforming up to 12 months ahead. Value and momentum strategies are particularly suitable complements because they tend to be negatively correlated, which potentially results in more favorable risk-reward characteristics of the portfolio.

SIZE. One of the factors we opted to add to the portfolio is the size factor, which is frequently also linked to more illiquid stocks. The rationale of this factor is that small companies tend to be riskier and therefore investors should be compensated by higher returns for holding companies with low market capitalization.

QUALITY. The quality factor looks at measures like accruals, asset growth, profitability, and leverage. Firms that are characterized as high-quality companies and thereby having more stable earnings, stronger balance sheets and higher margins tend to outperform low-quality stocks, over a long-time horizon. The above-mentioned factors were represented by factor ETFs and were chosen according to our factor timing strategy.

CARRY. In contrast to the earlier strategies, this one is not primarily focused on equity but currencies. Purchasing high-yielding currencies and going short in low-yielding currencies has been a profitable strategy over many decades. It relies on the fact that forward rates have been less than perfect predictors of future spot rates. In the context of carry, we continued the "rolling carry


PORTFOLIO PERFORMANCE 05/2020–05/2021



strategy" implemented by the managers of the 15th cohort. Under the appliance of macro-economic and diversification considerations, we pick the three highest yield currencies each month and go long in these. The short leg is either US dollar or Euro depending on the quotes. We execute this strategy with 3-month NDFs with a nominal amount of either €50,000 or $55,000 each. Due to the Corona pandemic and associated restrictions, we only had three 3-month NDFs at the time other than the target of nine NDFs outstanding at any point in time. This strategy emphasizes the quantitative aspect of investing by making a macro-economic evaluation of emerging market currencies a second-tier, though important consideration. Carry also relates to our fixed-income investments in high-yield bonds denominated in the respective emerging market currency. In combination with fixed coupon payments, our diversified bond basket is set up to get as close as possible to the PMP return targets despite the low-interest environment. In contrast to the NDF strategy, investment decisions for bond investing were rather macro-economically driven due to stronger restrictions regarding the investment horizon. Moreover, due to further decreasing yields we decided to maintain the fixed income positions of the Quant portfolio and we will not engage in restructurings accordingly.

The portfolio restructurings taken place during the Corona crash in the first quarter of 2020 allowed us to continue a more passive buy and hold strategy that was successful for our group in the past. Due to remarkable results over the long term, even though partially hit by the devaluation of the Turkish Lira recently, the following cohort is already interested in continuing the rolling carry strategy.

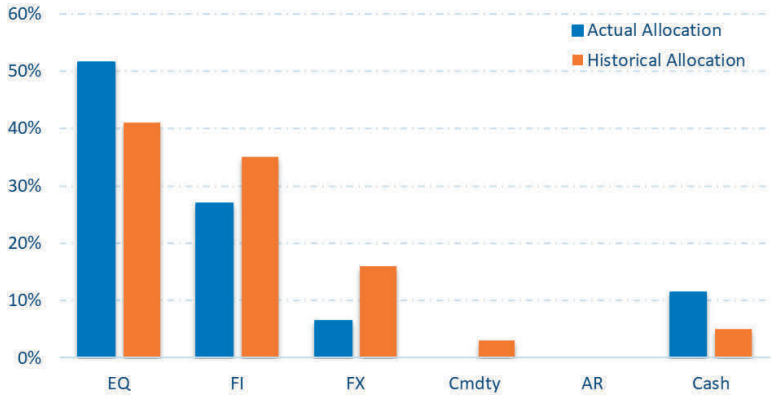
## 2. PERFORMANCE

The overall performance of the portfolio of the Quant Group during the manager term of the 17th cohort is depicted in figure 1. The total performance is 17.60% and the final AuM is 1.89 mEUR.

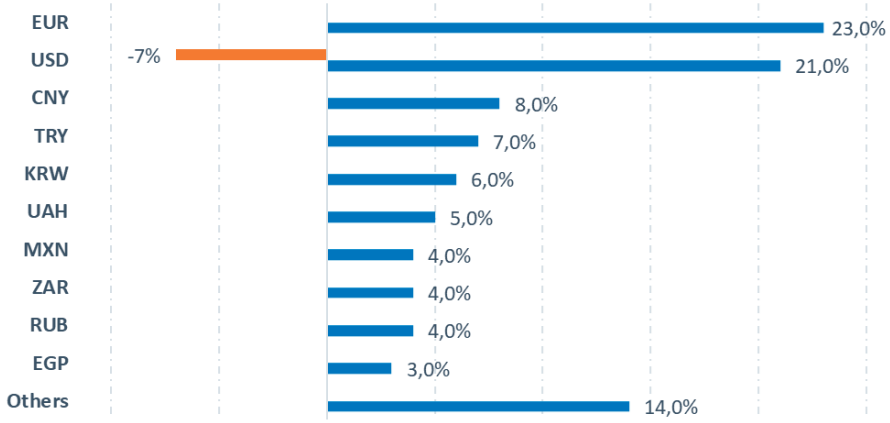
The performance of the Quant portfolio throughout the manager year exhibits a strongly positive development. The strategic decisions made together with previous managers, namely restructuring our equity positions, and executing 'opportunistic' trades, which is a deviation from our usual focus, led to a very successful rebound from the crash due to the outbreak of Corona (S&P 500 was down 33%). Over the manager year, the Quant portfolio participated in positive developments of the capital markets driven by beliefs of a quick recovery in developed countries. The restructuring of our equity positions taking the factor timing strategy into account and thereby adding the iShares Europe Value Factor ETF and the iShares EMU Small Cap ETF to our portfolio which perform best in recovery led us profit significantly both from a rebound in economic activity and in the capital markets. The performance of the portfolio was therefore mainly positive throughout the year with the highest drop of 5.76% in October when Corona Virus cases started rising worldwide again and the US election led to uncertainty in the markets. The performance peaked on the 6th of April with an overall performance of 17.75% since handover and has been moving sideways since then. With a very low sample volatility of around 5%, the Quant portfolio presents a twelve-month Sharpe ratio of 2.19.

Given the good performance, the Quant group is overall satisfied with the cumulative performance of 17.60% at the end of the manager year, with only the Academia Macro Finance group reaching a (slightly) higher return.






ASSET ALLOCATION COMPARISON 05/2019 & 05/2020




CURRENCY ALLOCATION 05/2021



In hindsight, given the expected new super-cycle of commodities, we could have further, if we had not sold it, participated on the rising commodity prices through the iShares Commodity Swap ETF, which rallied 8.54% recently.

### 3. ASSET ALLOCATION & EXPOSURE

Our asset allocation broadly follows the allocation of the previous managers´ but overall leans more towards equity. One key understanding of our team was to only extend our previous managers successful strategy and trade on regular and longer intervals only. Due to the debt load, many countries had to lever up to finance their economies during the pandemic, which was the primary decision about why the team overallocated equity over bonds.

The FX-carry strategy was continued: It requires larger holdings of cash in various currencies, which explains a large part of our cash exposure. At the end of our current management year, we converted all foreign currencies back to Euro in order to be able to purchase exposure to China. The remaining liquidity therefore is – apart from some minor coupon and dividend payments, exclusively Euro.

### 4. MARKET CONDITIONS THROUGHOUT THE YEAR

When we took over the portfolio, we were in a phase of optimism and a boom of tech stocks. After the crash in March 2020 investors had finally caught up with the shift towards digitalization and were rotating into growth stocks. The corresponding high valuations for tech stocks in the US were only corrected in September when NASDAQ experienced a large technical correction. November 2020 was then impacted by the US presidential elections, where US voters decided to prematurely end the Trump era in favor of president-elect Joe Bid-

en. While Biden promised to continue a hardline trade war with China, it was clear that to no extent would his policies be as threatening to international trade as the re-election of the Trump administration could have proven to be. Correspondingly, Chinese assets experienced a large increase in valuation, especially in the electric vehicle market. Early 2021 was, moreover, characterized by a boom in Cryptocurrencies which showed its early signs already in late 2020.

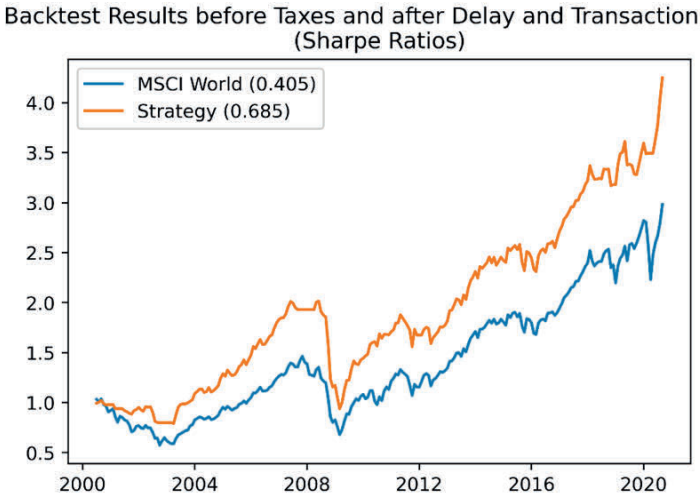
Overall, the Quant Groups decision about underinvesting in bonds proved fruitful, as over the whole manager year equities indeed strongly outperformed fixed income.

## 5. INVESTMENT BEHAVIOR

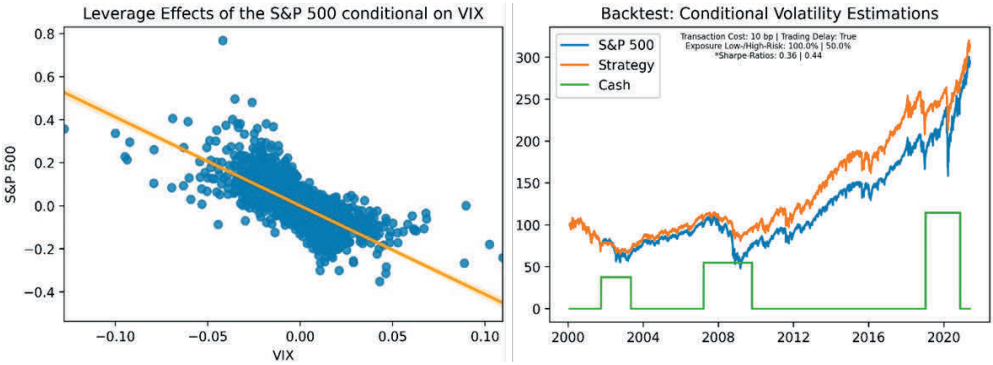
As described above, the quant portfolio seeks to harvest risk premia via long-term buy and hold strategies. Hence, we have remained faithful to the group's philosophy and continued its investment policy. Although this came with some necessary changes for the purpose of fulfilling the final objective of the strategy. The latter adjustments were carried out in three dimensions.

First, we had to accommodate the factor timing strategy to the newest economic and social developments. Namely, the size and value factors were included in our portfolio as a response to the COVID crisis. In particular, we expected the negative GDP growth that the globe experienced at the beginning of 2020 to translate into a relatively swift recovery. The suggestion by Hodges et al. (2017) was followed, who show that value and size outperform the rest of the factors during economic recoveries. Quality was kept as a continuation of the previous cohort for diversification






BACKTEST ON AN ADAPTED APPROACH TO GOYAL/WELCH (2008) ON EXCESS FACTOR RETURNS INSTEAD OF EXCESS ASSET RETURNS.




US INVESTOR-PERCEIVED MARKET RISK AND ITS IMPACT ON HOLDING US EQUITIES



purposes. In particular, this factor exhibits less volatility and smoother returns than the two newly incorporated factors. The strategy was then extended by considering equity-predictive variables similar to what Goyal/Welch (2008) suggested, which could robustly outperform a naive selection of factor allocations. Overall, little changes to our portfolio allocation were necessary throughout the year.

Secondly, we also decided to increase our activity in terms of opportunistic trades in order to increase performance. This, in tandem with the factor timing strategy worked nicely, as reflected in a Sharpe Ratio of 2.19. Available cash and proceeds from the FX strategy were utilized in order to gain exposure to Asia given its high economic growth and fine management of the COVID pandemic. In particular, a significant part of the portfolio performance throughout 2020 can be ascribed to our exposure to the Chinese market, which outperformed other geographies by a large margin. This was further complemented by our investment into Korea which also delivered significant outperformance during the worst waves of COVID.

Thirdly, we continued the NDF strategy for the purposes of gaining exposure to this asset class. Last cohort's performance in this field proved promising, however, some flags were already raised during their management year. Despite their positive results, we could observe as already broadly documented by academia, that the FX carry trade strategy exhibits a high negative skewness. In particular, a great part of the profits they managed to collect were partially eroded due to the Argentinian peso devaluation as a consequence of hyperinflation and excessive sovereign debt. Regardless, we decided to carry on with this strategy, which certainly delivered performance to some extent, however, we once again experienced the negative skewness inherent to this strategy. This was reflected by the devaluation of the Turkish Lira as a result of political and economic instability which slightly dragged our total return.

Lastly, we did not carry out any restructuring for the fixed income class as yields around the globe remained low and even decreased due to COVID. This proved to be a good decision as it seems that they will remain so for the near future. Therefore, continuing to underweigh fixed income seems to be the most reasonable action for now. It is important to note, however, that although we currently find ourselves in a low interest rate environment, our bond exposure is mainly to high yield fixed income, which tends to outperform in such scenarios. Hence, regardless, the portfolio remains to benefit from this.

To deal with our over-exposure to the US and our strong overweight of US equities, we introduced an early warning tool based on distributional properties of the CBOE VIX index to limit our exposure in times of uncertainty. This is done by working under a 2-regimes-scenario, one of which is a normal and the other a high-risk scenario. By computing the Mann-Whitney statistic on log changes of the CBOE VIX, structural breaks and volatility spikes might be uncoverable. Historically, this indicator has worked very well, but it also fired relatively quickly for the current COVID-19 crisis when markets were already perceived as "heated" back in late 2019. During our management year and especially after the recovery mid-2020, however, markets remained stable and equity exposure, consequentially, was at our upper bound.

## 6. TIPS FOR FUTURE COHORTS

The consensus across cohorts has been that genuine long-term investments have yielded superior performance for the portfolio. Hence, our recommendation is to keep this in mind and follow the plan of action regardless of the performance of your management year. Recall that incoming managers will have to overtake your strategies and might suffer the consequences alongside the portfolio in the long-term, should a short-term approach be implemented. In comparison with the other groups, our more long-term and, thus, less aggressive approaches to trading have yielded a strong performance. Keep in mind to focus your ideas and do not fall for quick testing and perceived pressure to act, since trading costs you Bid/Ask-spreads, trading fees with your bank, especially taxes, and probably follow-up costs for currency conversions as well.

The factor timing strategy in combination with the high yield fixed income has also delivered encouraging results throughout the life of the portfolio. Hence, we strongly recommend the continuation of this approach and especially emphasize the importance of the factor timing strategy as the group's main pillar. The latter has accounted for most of the performance of the portfolio.

We also encourage that incoming managers revisit the Hodges et al. (2017) paper for the purpose of reassessing the business cycle towards which we are heading and restructure the factor strategy accordingly. The momentum factor is currently trading at a discount and is a good performer after recoveries, hence the future cohort might consider it as a new incorporation to the portfolio.

Last but not least, we advise to remain vigilant on the NDF strategy due to its negative skewness. Do not follow the carry backtest blindly and always aim to complement it with a qualitative analysis. Although the Quant group highly relies on quantitative backtests this is a good example of why one need not follow the signal strictly. NDF-trading without "special" information has a negative implied value due to transaction costs and market frictions. So be sure to have a high-quality analysis to back up your trades.

## 7. CONCLUSION

We have been fortunate to have enjoyed favorable market conditions in our manager year, in particular for the factor timing strategy, and are content with our overall management. Furthermore, the group is pleased with its decisions that have revolved around this last strategy as well as its geographical opportunistic trades which highly boosted the portfolio return.

Naturally, there have been some regrets and decisions that we would have liked to have turned another way, such as closing our exposure to commodities or investing in the Turkish Lira. However, the impact of these have been minor and we receive them as valuable lessons for the future.

Having the chance to manage a portfolio in such turbulent markets as a consequence of the COVID is a rare opportunity. This has taught us valuable lessons which otherwise would have not been possible as well as thickened our skin for such difficult investment environments. Furthermore, in our humble opinion, we believe that this has also better prepared us to operate as portfolio managers during both thriving and poor socio-economical events.

The whole experience has been very enriching for all of us and even determined the investment preferences for some members of the group. Hence, we are especially grateful for this outstanding opportunity that PMP has provided us with. The learning curve has been extremely steep, which naturally comes with its hurdles, but regardless, worth the effort. Overall, we have found PMP to be an exceptional program that has equipped us with valuable tools for our upcoming incorporation to the job market or academia.

MANAGER REPORT

# ZZ – Entrepreneurial Group



COHORT 17

# Portfolio Management Program

2019 – 2021 • ZZ-ENTREPRENEURIAL GROUP



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MAY 31ST, 2021

## I. STRATEGY AND APPROACH OF THE GROUP

### I.I. STRATEGY

We understand investing à la ZZ as an extensive, discretionary global macro style approach towards financial markets that generally aims for outperformance and high returns whilst deliberately taking the associated risks.

Historically, key return drivers have been emerging- and frontier markets' fixed income assets as well as the respective local currencies complemented by equities. In particular, the ZZ strategy, which therefore focusing on EMs and FMs, intends to exploit inefficient valuations in

high-yield countries and thereby puts its focus on the academically characterized 'carry trade', that ensures continuous liquidity and capacity to act when opportunities arise. In line with that, the cash position is usually kept at an elevated level. Moreover, tactical deviations from core regions, as well as the target asset allocation facilitate ad-hoc reactions in extraordinary market environments that may boost returns.

### I.2. APPROACH

Back in October 2019, when we started as new ZZ analysts, our highly motivated managers introduced us to a professionally structured and well-performing portfolio and integrated us into the ZZ's business from the very first second to prepare us for the eventual takeover.

In terms of resources, participation, and organization we joined a highly sophisticated environment with decent methods for qualitative and quantitative research, as well as a broad range of instruments to develop strategies, being readily available. Nevertheless, thanks to extensive quantitative expertise in our team, we focused on contributing to the ZZ toolbox by designing an automated instrument for short-term NDF investments which follows purely systematic measures. The tool, therefore, offers a great deal of diversification concerning the discretionary NDF strategy, that is built on our preferred metrics i.e., value, momentum and carry.

With respect to the extraordinary circumstances that have accompanied us throughout the program, the ZZ's entrepreneurial approach was particularly advantageous for us as it increased our investment universe tremendously when price distortions could be observed across all markets and asset classes. That is, we benefitted from some rather untypical ZZ positions such as US equity and REITs




PORTFOLIO PERFORMANCE 05/2020–05/2021

and generally established a tactical shift towards a more balanced asset allocation. Hence, we conducted a restructuring of the portfolio in favour of equity, anticipating reflation and adapting to ongoing fundamental macroeconomic movements. To realize those alterations, we primarily reduced holdings that showed weak performance in the past, combined with a poor prospective outlook.

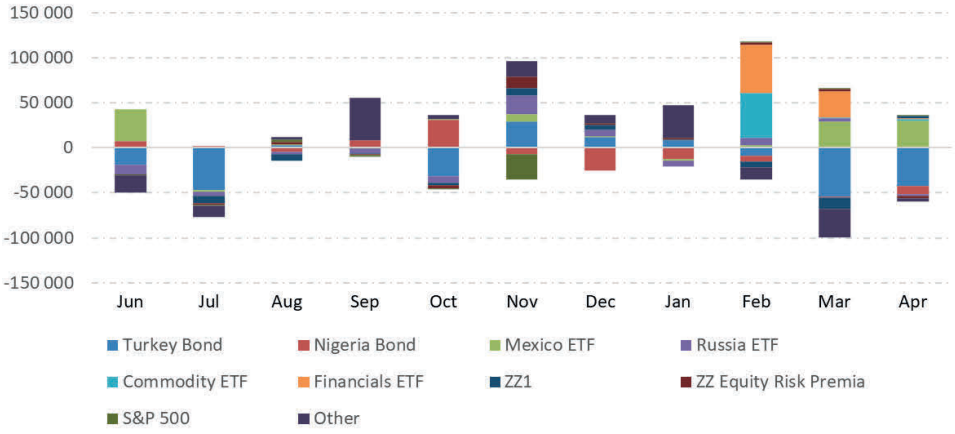
## 2. PORTFOLIO PERFORMANCE

### 2.1. OVERALL PERFORMANCE

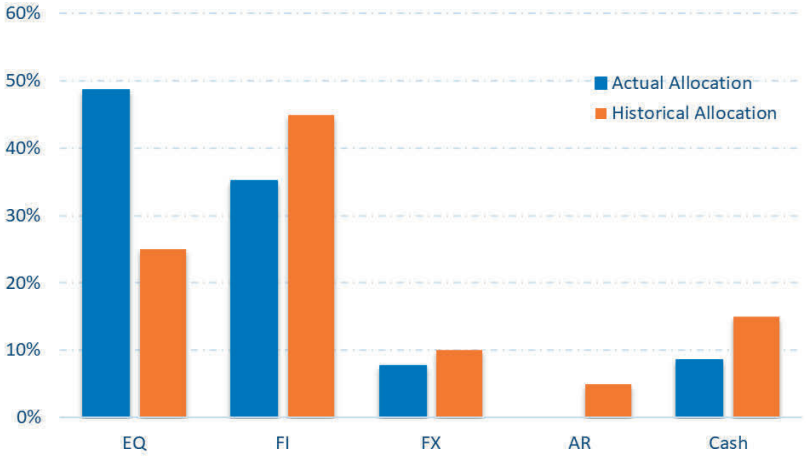
After taking over the portfolio in May 2020, we initially benefited from the sharp rebound that followed the COVID-19 crash in March. However, not long after the takeover, we experienced a sharp downturn up until the beginning of August, which can mainly be ascribed to our significant Turkey exposure at the time. Thus, an increasing inflation rate, loose monetary policy and the consequent deterioration in the currency greatly suppressed our performance. After assessing the situation, we decided not to book our losses, and instead remained patient in expectation of a better exit point.

At the end of August, after a weak with little movement, the portfolio was finally able to generate some profit in September. While stock markets were volatile due to the increasing COVID-19 cases and the upcoming US elections, our portfolio remained solid due to the large, fixed income allocation at that time. After a short drop, our strategy and allocation seemed to align, when we experienced a sharp rebound in our performance in October and November. That is, the positive vaccination news combined with rising commodity prices had quite positive effects on emerging markets and thus on our performance. Furthermore, with the change of Turkey's central bank governor and the largest interest rate increase in nearly two years in November, the Lira






10 LARGEST POSITIONS 05/2020–05/2021




ASSET ALLOCATION 05/2021

appreciated, and holding the position finally seemed to pay off. The position then went on and provided a solid return over the two upcoming months.

### 2.2. 10 LARGEST POSITIONS

While we were well positioned for December and January, our overall performance was negatively impacted by the Nigerian bond. Boxed into this position due to capital controls, we were limited in our possibilities to act, therefore, we focused on further diversifying our portfolio and generating return with other positions. The graph on the left clearly reveals when our portfolio was struck once again by Turkey in March due to the already mentioned governor change. That left us with almost no return over the whole year.

### 2.3. ASSET ALLOCATION

Finally, in April, we started to decrease the Turkey exposure as we assessed the position to be too risky and unpredictable to stay invested any longer. At the same time, we doubled down on some of our most promising equity holdings and screened the market for other potential sovereign bond positions to adhere to our strategic asset allocation. That was in line with our portfolio reassessment earlier in January. As we expected larger inflation and less upside potential in the fixed income markets, we agreed to increase our equity exposure while decreasing our less attractive fixed income positions in the context of a tactical shift. By focusing on short duration equities and commodities, we managed to avoid further losses. To guarantee a certain level of carry, we additionally built a dividend basket that provides us with frequent cash flows.

### 2.4. CURRENCY EXPOSURE

Throughout our managerial year, our currency exposure has naturally evolved as

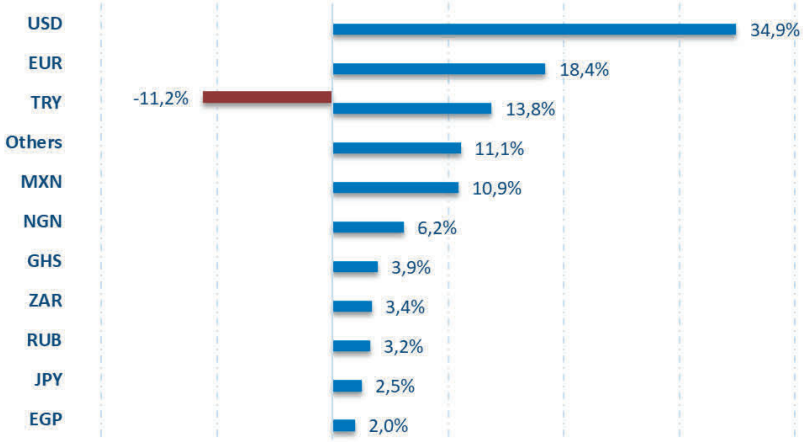
we have altered the composition of the ZZ portfolio. The most significant changes happened in our USD exposure, which has increased from -4.96% to 34.91%. At the same time, the Turkey exposure has noticeably declined from 33.54% to 24.93%. That is in line with our divesting and shifting towards a higher share of equity, which is strongly linked to the US. When we took over the portfolio, we had a 4.58% exposure in the US market which we quadrupled by taking up additional equity positions such as the S&P 500, Global Financials or US REITs among others. Furthermore, we complemented our bond exposure in Mexico by a significant equity stake as the current outlook is promising for both asset classes.



## 3. MARKET CONDITIONS THROUGHOUT THE YEAR

When we took over the portfolio at the beginning of May 2020, basically all asset classes were just coming from their multiple year's lows in March, comprising of equities, fixed income, and commodities. Due to central bank interventions and fiscal support for companies and individuals, all asset classes started to rebound from that point on going forward. Particularly Tech stocks began to outperform as they profited from the higher demand for digital services and e-commerce due to stay-at-home orders and lockdowns that were aimed to reduce the spread of the coronavirus. Jerome Powell, Chairman of the FED, vowed to keep interest rates near zero for an extensive period of time and to purchase public and private debt to create favourable long-term (re-)financing conditions for companies and the government to ensure a stable financial system during the crisis. As the money printing press gained steam in the US, bonds, stocks, and commodities continued to rise through late spring and summer of 2020. In contrast, investors doubted the strength of the US Dollar and feared the risk of inflation. As a result, the US dollar began to fall, while other currencies like the euro and safe-haven assets like Gold and Silver appreciated substantially in July. Gold hit a new all-time high in the first week of August, breaking through $2000/oz. By the end of August, Tech stocks almost gained 100% from the lows in March, with the NASDAQ rising from around 6,600 points to almost 12,500 in just under six months.

From the beginning of September, the stock market rally started to cool down as risks and uncertainties around the upcoming US presidential elections came into focus, while spreads of developed markets' bonds continued to tighten with monetary policy support. The markets did not give away which candidate they deemed more likely to win, though the surge in renewable energy stocks (also called the "Biden-Trade") was an indicator that many investors were betting on a change at the top of the US government. As the uncertainties continued to linger, all assets retreated including both growth and value stocks in the US and Europe and also commodities and EM assets. The showdown of the US presidential elections took place on the 3rd of November when Donald Trump felt confident to continue for a second term after the first count of votes despite his bad

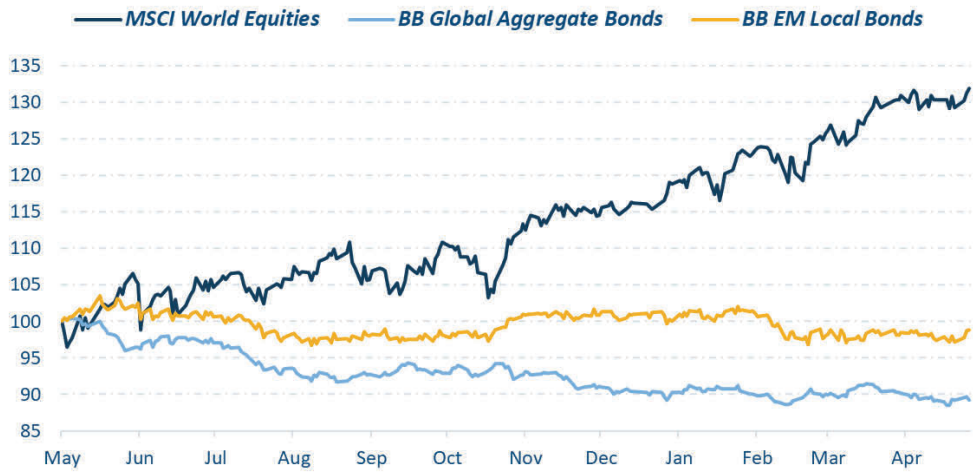



CURRENCY EXPOSURE 05/2021

reputation on handling the pandemic. Due to the lockdown and other social restrictions, a record number of Americans decided to vote by mail, therefore counting all votes and determining the winner of the election took much longer than in the past. However, after a few days, it became clear that Biden would get the majority of the electoral college votes, which made him the next US president.

Only a few days later, on the 9th of November, Pfizer and BioNTech published their vaccine results, which showed an efficacy of over 95% against COVID-19. This great news for the economy boosted investors' hope that we would get back to normality soon, so the markets went off like a firework. Risk-off assets like the US Dollar and Gold were sold off, while stocks and bonds surged higher. From this point on, the so-called "reflation trade" formed, which means that especially hard-hit and cyclical industries (like the oil and travel industry) as well as EM and other risk-on assets began to outperform.

By the start of the new year, the first signs emerged that inflation might become more of a topic in 2021 as people might increase their spending due to a consumption backlog that already resulted in a higher savings rate in 2020. In January, a slow but steady decline in bond prices could be observed. A completely different and unexpected phenomenon occurred in the last week of January – a group of retail investors on Reddit, more specifically on a subreddit called "WallStreetBets", came together and discussed the stock of Gamestop and deemed it a potential target for a short squeeze as over 100% of the float was sold short by hedge funds and other institutional investors. Indeed, the short squeeze kicked in and as short-sellers retreated also from other highly shorted stocks, investors turned into a risk-off mood. A week later, the Reddit mania was over, and the market recovered from the swift shock.






While inflation fears grew in February, fuelled by higher-than-expected inflation readings in the US and Europe, the bond market became more and more bearish. By the end of February, bonds were sold off heavily, pushing yields higher. While the market stabilized in March, the reflation trade started to outperform the rest again in April 2021, as a new fiscal stimulus was agreed on under the Biden administration. Bonds stopped their decline and stocks and industrial commodities e.g. copper and lumber rallied massively, reaching new all-time highs. Stock markets outside the US, especially in Europe and the EM, were amongst the biggest winners. With the beginning of May and the handover of the portfolio to the new managers, inflation stays the dominant topic. Bonds show again weakness as the economic recovery picks up due to widespread vaccinations and the end of the pandemic within reach. It remains to be seen, whether central banks will be able to keep yields low during the time of elevated inflation, or if the classic monetary policy of hiking rates in times of heated inflation will see a comeback, with potentially greater impacts on the economy and financial assets.

## 4. INVESTMENT BEHAVIOR

The unprecedented circumstances of the pandemic world have forced us to pivot from the traditional source of carry of the ZZ group, which is based predominantly on the fixed income exposure to the frontier and emerging markets. With almost half of the portfolio allocated there, the pandemic outbreak last year caught us off guard. Hence, we faced significant difficulties with finding the optimal allocation and it took us more time than it should have, to adapt to the new paradigm of financial conditions and implement the necessary alterations.

Our flagship NDF strategy is the implementation of an FX carry trade op-

timized for harvesting the interest rate differential boosted by expected currency appreciation. A carry trade consists of shorting the low yielding currency (in our case EUR or USD) and buying the high yielding one. The carry premium revealed its fragility during the surge in demand for the US dollar at the beginning of the pandemic in the western world. The monetary interventions that followed have resulted in 0% interest rates across developed and even some emerging markets. This has negatively affected our NDF strategy, by constraining yields in the frontier markets since the US Federal Reserve funds rate serves as a benchmark and reference for the central banks around the globe.

With bond yields as well around historic lows, we were forced to look for alternative sources of carry across available asset classes, generalizing it to a difference between any higher-yielding asset financed with low yielding cash. Under such conditions we had to swiftly rebalance our portfolio, partially replacing bonds with higher-yielding asset classes, keeping 30% of the portfolio allocated to the fixed income, building up on equities and continued to maintain exposure to alternative asset classes such as dividend futures.

During our term, we have been progressively unwinding the overweighted Turkey exposure which has proven to be the right choice. The deterioration of quality of public institutions combined with the disruption of the hospitality industry caused by the COVID pandemic has negatively affected the Turkish Lira.

We strongly believe that the portfolio inherited by the new managers is now already well-diversified, resilient, and well prepared for the uncertain times ahead, however, the dynamism of the current situation requires it to be constantly challenged and evaluated. We believe the most crucial factor implying the composition of the portfolio for the next year is the inflation in western economies, especially in the United States. As of the writing date of this report, the latest Consumer Price Index in the US was 4.2%, the highest since April 1982. Going forward, it is crucial to evaluate both structural and cyclical inflation factors. The key question we encourage the new managers to ask themselves is whether the rise of inflation in the US is just a temporary phenomenon caused by the unfreezing of the economy and postponed realization of demand. If it is not temporary, would it lead to the hike of interest rates or rather an era of the increased inflation? We also encourage them to extend the spectrum of asset classes by the positive exposure to volatility.



## 5. CONCLUSION, OUTLOOK, AND TIPS FOR THE ANALYSTS

Whereas most of us have joined the PMP with a certain bias towards equity, we built on that and developed a more holistic understanding of markets and investments, particularly strengthening our abilities in macroeconomic and political analysis and using these to identify opportunities. Hosting weekly team meetings, following extensive discussions, and learning from the great exper-

tise of our tutor Richard Boulanger, who patiently taught and answered our questions no matter what, eventually enabled us to professionalize our decision-making as well as our investment behavior. Therefore, we were able to outgrow ourselves.

It says that one learns the most during times of stress in financial markets since the rules that were thought to apply may prove unreliable if panic and irrationality distort human psychology and therefore decision-making. We sincerely hope that the global pandemic will be only a once in a lifetime event, nevertheless, we were able to manage the ZZ portfolio throughout the COVID era, which at the same time, has represented a rare opportunity to learn as it forced us to adapt and collaborate in an unusual order of magnitude. Overall, the sharp decline, and the even faster V-shaped recovery in 2020 capture the market turbulence perfectly that we experienced and therefore affected our course of action. And we must admit that we have not fully anticipated this development. We now know from first-hand experience that the market will not wait until you are ready to decide about how to proceed and that establishing a view and acting accordingly represents a key part of investing since a lack of action will prove worse than being wrong sometimes.

Addressing our analysts as well as future PMP generations, we would like to highlight all the advantages of this truly unique opportunity. Growing together as a team and delivering results during demanding times are invaluable soft skills that accompany the fundamental knowledge and business acumen in asset management that we got to enjoy. Hence, however turbulent markets might be, history teaches us that good value for money is always true but often hides in between the lines. Therefore, we encourage all PMP students to be open-minded, always discuss ideas proactively and just do it if their intuition, the facts, and the circumstances are in favor of an investment.

Lastly, we are extraordinarily grateful and proud of participating in the Portfolio Management Program and gladly preserve the spirit, the skills, and the knowledge gathered throughout this truly unique journey approaching our diverse future career paths.

ANALYST REPORT

# Academia Macro Finance Group



COHORT 18

# Portfolio Management Program

2020 – 2021 ◆ ACADEMIA MACRO FINANCE GROUP



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MAY 31ST, 2021

This report will provide a short overview of projects the analysts of the Academia Macro-Finance group have pursued and participated in for the 18th class of the PMP. Based on our underlying investment strategy we were focusing on ongoing shifts in macroeconomic dynamics as well as the implementation of systematic strategies harvesting potential premia across financial assets. The report is structured as follows: At first, we will emphasize two discretionary trades. Then, we will provide a summary of the already implemented VIX strategy and highlight potential improvements along with our backtest.

## I. BATTERY SOLUTIONS – THE CASE OF LITHIUM

### I.I. MOTIVATION

In contrast to our managers, we were facing a very different global macroeconomic climate this year. Not only has the widespread expansion of vaccination programs in developed countries led to a relaxation of restrictions in social and economic everyday life, but instead of recession-fear driven markets we find ourselves on the onset of a new business-cycle. We strongly believe that the pandemic has not put a halt to ongoing shifts in the global economy. Low interest rates in combination with multiple fiscal stimulus packages allow governments to increase public investment into sustainable climate-protecting sectors. Energy and transport, being the most emission-intensive sectors, play a crucial role in decreasing overall emissions and in reaching the emission-reduction goals of many Western countries. Therefore, we are focusing on one key commodity, playing an important role in the transition of this sector: Lithium.

### I.2. THE BIGGER PICTURE

Over the last years, some countries have announced and implemented phase-out agreements for sales of new internal combustion engine (ICE) vehicles. The agreements differ in their extent, but mostly include passenger-cars and light trucks. Although, leading vehicle markets as China, Germany and the USA still lack long-term binding commitments, their governments have indicated, along with many other countries, that they will make a transition to electric vehicles (EV).

The main electric vehicle manufacturers (BYD, Tesla, VW, BMW) are using lithium-ion batteries as their storage unit for energy. In fact, lithium-ion batteries provide some advantages over other battery technologies, such as batteries based on nickel manganese cobalt oxide (NMC). This is due to a higher durability and lower sensitivity to cold temperatures. Overall, the market for EVs is expected to grow by 20 times by 2040. A third of the worldwide production of lithium is used for batteries in EVs.

Along with the upside potential, we can also identify some downside potential lying in slower-than-expected phase-out agreements, an increase in recycling of old batteries and the development of new battery technology.

Since lithium is not directly tradable at a stock exchange, our strategy involves the purchase of a sector ETF, which allows us to gain direct exposure to mining companies and indirect exposure to the price of lithium itself.

### I.3. CONCLUDING ARGUMENTS

The managers as well as the analysts of the Academia Macro-Finance group see a strong growth potential in the demand and utilization of lithium. On the one hand, we want to exploit the current momentum of shifting from internal combustion engine to electric vehicles. On the other hand, the lithium spot price has decreased since 2018 due to oversup-

ply. We expect rising demand caused by a higher production of EVs and in general higher demand for commodities caused by a revitalized world economy. Besides its usage in EVs, lithium batteries are also implemented in cellphones and laptops. Further, the commodity is needed to produce cosmetics, polymer, and many other daily life products. Therefore, we, the Academia Macro-Finance group, are currently invested in a battery solution equity ETF, which exposes our portfolio to the three top lithium mining companies amongst other enterprises in the sector.

## 2. THE RENEWABLE ENERGY SECTOR

### 2.1. MOTIVATION



Based on Rui Albuquerque et al (2020) the companies with higher ESG ratings show higher profitability and lower volatility during economic drawdowns, which accelerates investors' recognition of the importance of sustainable investing. To increase our exposure to that trend and the recent economic recovery, we want to invest into equity in the Clean Energy sector.

The main motivations behind this decision are better international cooperation on reducing the carbon footprint, various governments' support, increased competitiveness of renewables, climate change becoming the biggest challenge after overcoming COVID-19, volatility of oil prices (immensely increased during market crashes), and the fact that the majority of countries around the globe want independence from oil states.

### 2.2 THE BIGGER PICTURE

As Clean Energy becomes more essential and supported, new technologies are implemented, and the prices reduce immensely. According to International Energy Agency that more than half of the renewable capacity added in 2019 achieved lower power costs than the cheapest new coal plants. Since 2010, utility-scale solar PV power has shown the sharpest cost decline at 82%, followed by concentrating solar power (CSP) at 47%, onshore wind at 39%, and offshore wind at 29%. Immense cost reduction and increased efficiency in the last decade were due to increased technological development, competitive supply chains, and government policies. According to research provider Bloomberg New Energy Finance, electric vehicles are expected to reach price parity with most gas and diesel vehicles by the middle of the decade and exceed it shortly thereafter, even without buyer subsidies.

Many governments across developed and developing countries have set the targets to combat climate change and promote green energy. This has led to increased recognition among investors.

### 2.3. CONCLUDING ARGUMENTS

To sum up, there is remarkable potential for providers of clean energy. They will be subsidized and there will be technological improvements in the coming years. We think that this is not entirely reflected by the market. Because of the current situation, there were many de-

lays in construction activity due to supply disruption, lockdown measures and emerging financial challenges. However, most of these delayed projects are expected to come online after the pandemic is over and lead to a rebound in capacity additions. We will further investigate profitable sectors of green investment.

## 3. VIX STRATEGY

### 3.1. BACKGROUND & MOTIVATION

One of our primary goals is diversification away from traditional asset classes. While equities and fixed income have historically (and will for the foreseeable future) provided the backbone of most long-term investment strategies, alternative asset classes and risk premia can provide attractive diversification benefits, boosting the amount of expected return per level of expected risk. It is through this lens that we view a strategy in VIX futures.

A further motivating factor is that our managers created and implemented a customized version of a VIX futures strategy. We sought to fully understand this trade such that we could take it over along with the portfolio. In its current form the strategy is a systematic relative value trade. This fits with our aspiration to overlay many such trades to access levered exposure to novel sources of risk.

We also believe there is myriad potential to improve the strategy from its current implementation – something our managers began and which we will continue.

### 3.2. THE BIGGER PICTURE

The VIX futures markets are quite attractive, offering the potential for systematic carry as well as equity (specifically S&P 500) tail risk hedges. For background, the VIX index computes a weighted average implied 30-day volatility of the S&P 500 based on out-of-the-money European options. The CBOE created futures contracts in 2004, which became very popular; the first several nearby monthly contracts are highly liquid, making the index easy to trade. Due to the frequent use of volatility products to hedge equity downside and tail risks, implied volatility is generally higher than realized volatility. This apparent market inefficiency could be driven by over-hedging, or possibly by inefficient hedging with volatility products due to regulatory constraints, for example against short selling. What it means for a systematic investor in the VIX futures market, however, is that on average one should expect a positive carry from selling VIX futures. This carry trade comes with some extreme drawdown risks, especially if traded without a hedge. Volatility spikes are notoriously difficult to predict, frequently sudden and huge in size, and can quickly wipe out short positions. As a result, a successful strategy would have some signal for deciding whether to enter a short position for carry, or a long position to capture a spike.

To explore this topic, we consider the 2014 paper by Simon & Campasano, "The VIX Futures Basis: Evidence and Trading Strategies", as our primary reference. The authors provide convincing


FIGURE I – UNHEDGED REPLICATION



backtests for a relatively simple strategy: use the futures basis (i.e. the difference between futures level and spot price) to compute a ceteris paribus expectation of daily profit from holding a contract, and take a corresponding long or short position. The authors also suggest hedging this position using S&P futures due to the strong correlation, though we consider alternatives. The theoretical basis for this trade of course relies on having some expectation that the curve will not move. The authors frame that question as follows: does the current spot price predict the terminal futures price, and does the current futures price predict the terminal spot price? By showing that the answers are true and false respectively with statistical significance, the paper suggests that futures prices should have a "pull to par" and one could take advantage of this mispricing.

### 3.3. OUR APPROACH

The core of our analysis was to test the paper's results out-of-sample, which overlaps roughly with the inception date of our PMP portfolio. Our implementation used essentially the same methodology as the paper: we consider the first nearby contract with at least ten days remaining to expiration, we restrict the holding period for any single trade to 9 days (to avoid holding to expiry), and we implement the following signals for entering (or exiting) a position:

- Long Entry if Basis < -0.10 VIX points
- Long Hold if < -0.05 VIX points
- Short Entry if > 0.10 VIX points
- Short Hold if > 0.05 VIX points

The resultant backtest is shown in Figure 1

We notice that we get great in-sample results, but out-of-sample the results are weaker. We then consider that we can probably benefit from additional leverage if we hedge the contract. Given difficulties inherent in hedging with a different asset class (basis risk), we considered a more straightforward option to hedge with the 4th nearby contract. We specifically chose the 4th nearby because it takes advantage of the tendency for the futures curve to flatten as time to maturity increases, resulting in the greatest roll spreads when the hedge is further down the curve. This does of course mean the hedge is less exact, so we take more absolute exposure, which is an ongoing consideration. However, we were motivated by the ubiquity of 3rd and 4th nearby's being chosen for popular implementations of systematic VIX strategies. The results of the hedged strategy can be seen in Figure 2.

The result is a similar return profile, but one that trades less often as the signal is derived from spread roll yield, and not just on the eligibility of the first nearby. The return is also much more concentrated, with the bulk coming from the 2008 and 2020 market shocks.

A short comparison of the summary statistics is shown in Table 1, on the assumption that we would require $100,000 to hold against the unhedged position per contract and $25,000 to hold against the hedged contracts, based



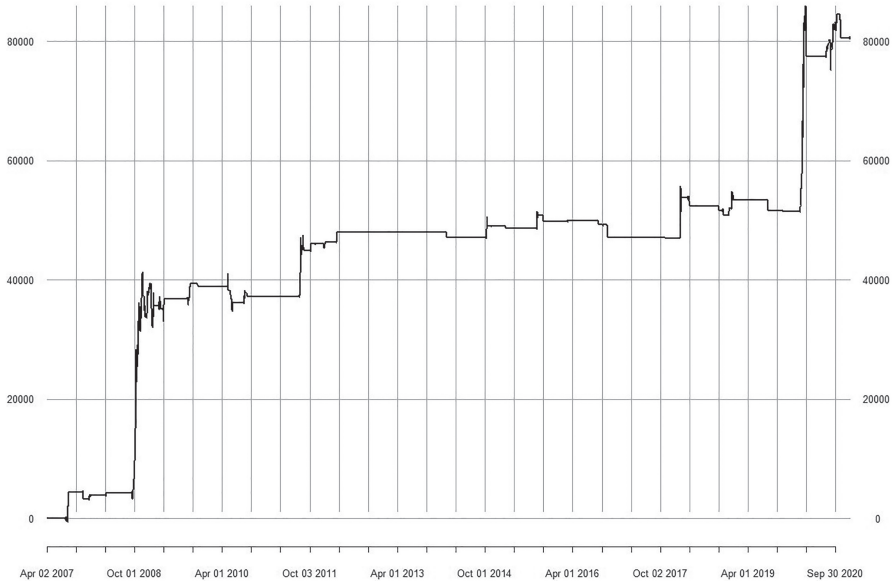


FIGURE 2: HEDGED REPLICATION

| UNHEDGED | Full Backtest | Out of Sample | Out of Sample ex-2020 |
|---|---|---|---|
| Return (p.a.) *(T-Stat)* | 6.71% *(2.9967)* | 1.76% *(0.943)* | 0.68% *(0.510)* |
| Vol (p.a.) | 8.48% | 5.94% | 4.10% |
| Sharpe | 0.792 | 0.297 | 0.165 |
| Downside Vol (p.a.) | 5.06% | 3.40% | 2.33% |
| Sortino | 1.327 | 0.518 | 0.290 |

| HEDGED | Full Backtest | Out of Sample | Out of Sample ex-2020 |
|---|---|---|---|
| Return (p.a.) *(T-Stat)* | 10.19% *(3.111)* | 4.04% *(1.462)* | 0.46% *(0.292)* |
| Vol (p.a.) | 12.47% | 8.62% | 5.81% |
| Sharpe | 0.817 | 0.469 | 0.079 |
| Downside Vol (p.a.) | 6.43% | 4.09% | 2.89% |
| Sortino | 1.584 | 0.988 | 0.158 |

TABLE I

on historical potential net exposure and the need to post variation margin.

It is worth mentioning that our manager's implementation, and by extension the implementation we will begin from, diverges from the paper in meaningful ways. We hedge using 2nd nearby to optimize the exactness of the hedge. We simplify and restructure the signal as follows:

- Long Spread (i.e. Short 1st nearby, Long 2nd) if <4% net percentage (annualized) roll
- Short Spread (i.e. Long 1st nearby, Short 2nd) if >84% net percentage (annualized) roll

Note that net percentage roll equates roughly to the expected profit from a short spread position. This eliminates holding periods and different exit thresholds, resulting in much more net exposure to the strategy over time. It also encourages long spread positions and discourages short spread positions, reflecting empirical evidence that the VIX curve tends to decrease over time, and the frequency with which there are carry opportunities in a contango futures curve. The resultant backtest is shown on the top of the next page.

Obviously, this introduces more volatility, but has a much higher level of absolute return than an exact implementation of the academic paper methodology. This is highly attractive, and it drives us towards our current efforts to further optimize the strategy.

We can see that immediately following large gains, the strategy tends to "give some of them back", experiencing sharp drawdowns of lower magnitude than the preceding gains. We believe that a momentum signal identifying more optimal exit timing following large gains could be both possible and advantageous. We may also want to consider additional metrics with some grounding in the academic literature to increase the predictive power of our signal, such as absolute level of the VIX, or trading volumes.

## 4. CONCLUSION – THE VIX TRADE RATIONALE

We obviously want to know, with such a flat out-of-sample performance ex-ma-

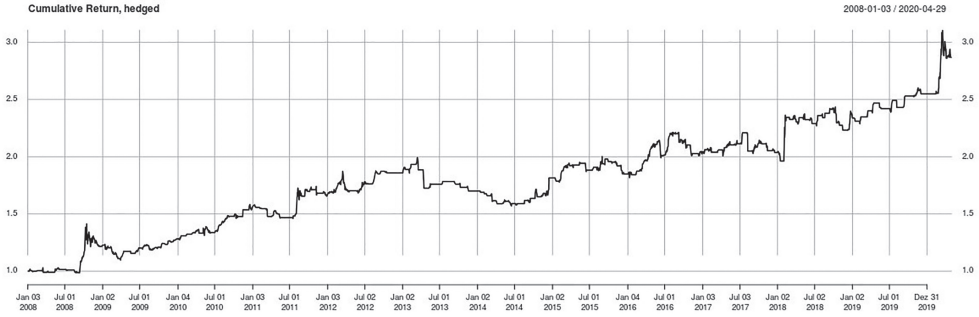


FIGURE 3 – CURRENT IMPLEMENTATION

jor tail events from our paper replication strategy, whether the fundamental paper rationale held out-of-sample. We re-examine the regressions to see whether futures prices still hold predictive power out of sample for future spot levels, and vice versa. The results of this analysis are provided in Table 1 on the bottom of the next page.

Regressions are run on the basis as an explanatory variable for changes in the VIX spot and 1st nearby futures. We broadly match the paper's results, with the exception that we see statistically significant evidence for the basis influencing the spot. We also see that the trade rationale is much weaker out-of-sample.

That is to be expected – following the Great Recession and the popularity of volatility as a new asset class, much of the economic profit opportunity identified by Simon and Campasano should have been competed away. However, there is still significant predictive power of the basis for future spot prices, and the market forces driving the inefficiencies have not fundamentally changed. Our current implementation shows that a reconfiguration of the strategy parameters can lead to more robust results. As a result, the trade is still of interest, and there is an impetus to find additional drivers of VIX changes and incorporate them into our signal. This will be a focus in our manager year.



| Full Backtest | VIX Change ($R^2$ = 2.89%) | Futures Change ($R^2$ = 4.09%) |
|---|---|---|
| Constant | -0.397*** (1.18e-05) | -0.350*** (4.72e-05) |
| Basis Coefficient | 0.435*** (<2e-16) | -0.495*** (<2e-16) |
| **In Sample** | **VIX Change ($R^2$ = 3.27%)** | **Futures Change ($R^2$ = 9.06%)** |
| Constant | -0.496*** (0.000279) | -0.424** (0.00173) |
| Basis Coefficient | 0.361*** (3.64e-11) | -0.616*** (<2e-16) |
| **Out of Sample** | **VIX Change ($R^2$ = 2.75%)** | **Futures Change ($R^2$ = 1.35%)** |
| Constant | -0.496** (0.00213) | -0.377*** (0.000902) |
| Basis Coefficient | 0.526*** (1.68e-14) | -0.339*** (7.99e-08) |

TABLE I

## REFERENCES

"Growing Momentum: Global Overview of Government Targets for Phasing out Sales of New Internal Combustion Engine Vehicles | International Council on Clean Transportation." Accessed May 20, 2021. https://theicct.org/blog/staff/global-ice-phaseout-nov2020.

Lins, Karl V., Henri Servaes, and Ane Tamayo. "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis." The Journal of Finance 72, no. 4 (2017): 1785–1824. https://doi.org/10.1111/jofi.12505.

Omar, N., P. Van den Bossche, G. Mulder, M. Daowd, J. M. Timmermans, J. Van Mierlo, and S. Pauwels. "Assessment of Performance of Lithium Iron Phosphate Oxide, Nickel Manganese Cobalt Oxide and Nickel Cobalt Aluminum Oxide Based Cells for Using in Plug-in Battery Electric Vehicle Applications." In 2011 IEEE Vehicle Power and Propulsion Conference, 1–7, 2011. https://doi.org/10.1109/VPPC.2011.6043017.

Simon, David P., and Jim Campasano. "The VIX Futures Basis: Evidence and Trading Strategies." The Journal of Derivatives 21, no. 3 (February 28, 2014): 54–69. https://doi.org/10.3905/jod.2014.21.3.054.

"The New 'gold Rush' for Green Lithium - BBC Future." Accessed May 20, 2021. https://www.bbc.com/future/article/20201124-how-geothermal-lithium-could-revolutionise-green-energy.

ANALYST REPORT

# Quant Group



COHORT 18

# Portfolio Management Program

2020 – 2021 • QUANT GROUP



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MAY 31ST, 2021

## I. INTRODUCTION

As the Quant Group's investment philosophy is centered around capturing quantitative risk premia with a major focus on factor investing, our previous managers introduced the fundamental strategy of Factor Timing for Equities. This strategy is based on the ideas developed by Hodges et. al. in "Factor Timing with Cross-Sectional and Time-Series Predictors" (2017), who found that depending on the economic regime and market conditions, value, size, momentum, quality, and minimum-volatility smart beta factors perform differently. Whilst Hodges et. al. came in benefit of classifying the economic regime for their analysis in retrospective, for the Quant Group's strategy,

it is essential to identify or even predict the business cycle as close to real-time as possible. Some of our work as analysts focused on identifying the indicators that can predict one or several business cycle stages. During our research for feasible indicators, we questioned ourselves on "How high should we expose ourselves to this strategy?", as, after all, the Hodges et. al. strategy revolves around factor timing solely for equities.

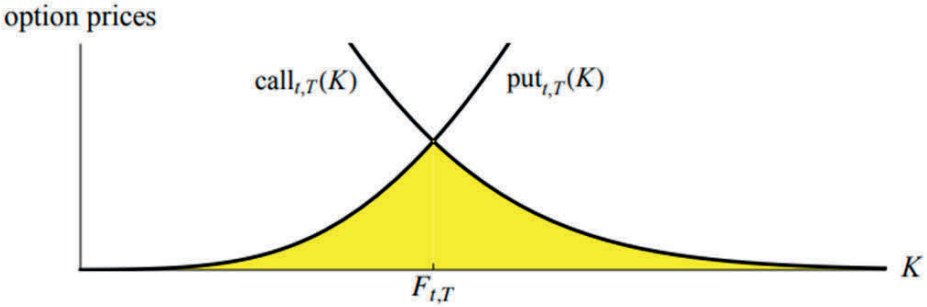
We thus started investigating on exposure management and explored the paper "Volatility-Managed Portfolios" by Moreira and Muir (2017), as well as the paper "What is the expected return on the market?" by Ian Martin (2016). From the latter we arrive at the new measure of the lower bounds for equity risk premia, which in combination with results from the former paper gives some insights into what drives the change in exposure to the equity market, and thus, this relates to the previously adapted strategy on Factor Timing for Equities, based on Hodges et. al. (2017).

## 2. THEORY

The paper by Ian W.R. Martin "What Is the Expected Return on the Market?" (2016) argues that the lower bound on the equity premium can be measured in real-time and derived from index option prices, imposing minimal theoretical structure to the model. The results point to a new view of the equity premium: it is very volatile, it is right-skewed, the lower bound is approximately tight, and disproportionate amounts of extremely high expected returns are concentrated over the very short run. Hence, we find that one of the possible strategies is to use option prices to identify intrinsic market or stock signals, and use them to evaluate the exposure of our portfolio, e.g. via performing timing strategies for expected returns, predicting probability of a crash, and similar.

We now turn our attention to the strategy of volatility-managed portfolios. The motivation for this strategy comes from the






The lower bound on the expected excess return of any asset (under certain assumptions) is obtained as $\mathbb{E}_t R_T - R_{f,t} \geq \frac{2}{s_T^2}\left[\int_0^{F_{t,T}} put_{t,T}(K)dK + \int_{F_{t,T}}^{\infty} call_{t,T}(K)dK\right]$ see shaded area in the picture above (figure from the Paper)

concern of how much exposure we should ideally take on (e.g., 80% or 120%). To answer this problem, we came across the term Volatility-Managed Portfolios. Our main reference regarding this topic was the paper of Moreira, Alan, and Tyler Muir called Volatility-Managed Portfolios". To further deepen our knowledge, we consulted other similar papers as "Understanding Volatility-Managed Portfolios" by Cejnek and Mair (2021), "The Impact of Volatility Targeting" by Harvey et. al. (2018), and, lastly, "Volatility-Managed Portfolio: Does It Really Work?" by Liu et. Al. (2019). In essence, the strategy is about increasing the exposure when volatility is low and decreasing it, when it is high and thereby boosting Sharpe Ratios and Utility gains. Contrary to the intuition that the standard risk-return tradeoff should lead to underperformance of a portfolio that scales down exposure during volatile periods Moreira and Muir (2017) actually show that Volatility-Managed Portfolios produce robust and significant alphas. To properly understand the strategy, one should have a closer look to the building volatility return formula:

$$f^{\sigma}_{t+1} = \frac{c}{\widehat{\sigma^2_t}(f)} f_{t+}$$

$f^{\sigma}_{t+1} \in$ (vola managed returns), $f_{t+1} \in$ (standard returns)

Let us assume we would be interested in monthly rebalancing of the portfolio which would mean that the term in the denominator is the last month's realized daily return and the returns themselves are on monthly basis. The crucial point here is that c represents a normalizing constant, and its only purpose is to guarantee that both return portfolios have the same standard deviation. Subsequently, the authors performed the following regression resulting into large alphas regardless of the chosen timeframe and strategy specific exposure boundaries:

$$f^{\sigma}_{t+1} = \alpha + \beta f_{t+1} + \epsilon_{t+1}$$

Since the strategy generated high alphas especially during economically bad times, the authors claimed that their approach would perform well in these times. Additionally, they argued that with this strategy a mean-variance investor would be able to expand the efficient frontier. All those points mentioned above were at first glace very tempting and, hence we selected this approach to further elaborate on our portfolio.

## 3. STRATEGY AND BACKTEST

The data we used for our analysis is the same as the authors used in their paper, namely the Fama French Data which one can easily obtain from the Kenneth R. French Data Library.

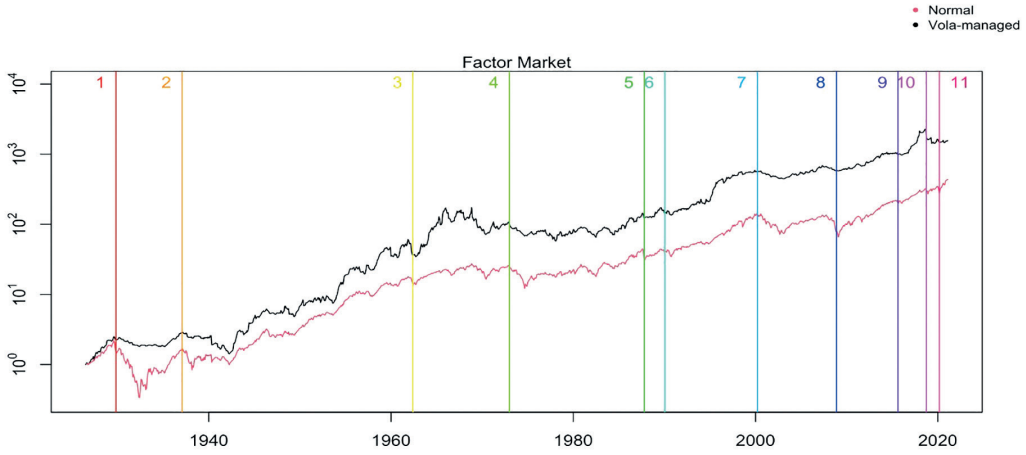
Having the above setup in mind, we were able to reproduce the main outcome of the paper and, in addition, we were able to extend the analysis to other indices and even to the Quant portfolio. To begin with, the chart on the bottom of the next page shows the evolution of the Market Factor over time with the Buy and Hold strategy and once with the Volatility-Managed Portfolio strategy considering monthly rebalancing. In addition, we also marked the major crisis of the last century and, indeed, we were able to also graphically

confirm that the strategy worked quite well on average for crisis. Once having set up the algorithm in R it is very easy to apply the code for different indices or portfolios. In the charts on the next page you can find the performance for different indices. From the graphscan be infered that the strategy outperformed especially in the US market. One reason for that might be that the strategy was back-tested to this market which might indicate that the model is overfitted to the US market. For the reaming indices, the graphical representation conveyed a mixed picture. On the one hand, the algorithm has been profitable for ATX and NIKKEI. On the other hand, the FTSE, the EUROSTOXX 50 and the MSCI World performed poorly leading us to the conclusion that the positive relationship described in the paper could not be found for other markets.

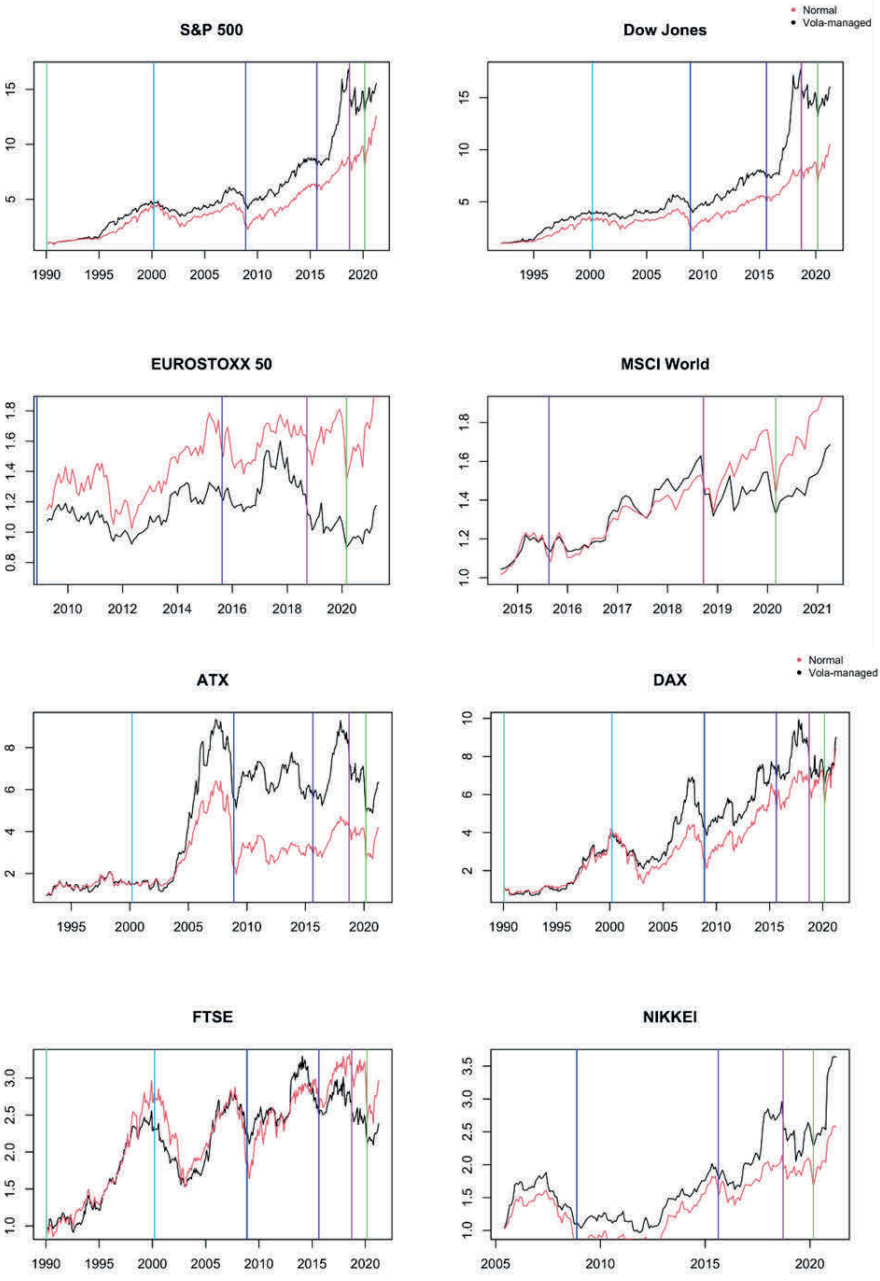
| NOTATION | |
|---|---|
| 1. | Wall Street Crash (1929) |
| 2. | Great Depression (1937-38) |
| 3. | Kennedy Slide (1962) |
| 4. | Stock Market crash UK (1973-74) |
| 5. | Black Monday (1987) |
| 6. | Recession caused by oil increase (1990) |
| 7. | Dot Com Bubble (2000) |
| 8. | Financial Crisis (2007-08) |
| 9. | Stock Market Sell-off (2015-16) |
| 10. | Cryptocurrency Crash (2018) |
| 11. | COVID-19 pandemic (2020) |

As regards to the Quant Portfolio, we tried to set up a strategy that would be feasible to a large extend. Since the original strategy presented by the paper would sometimes suggest increasing the exposure up to 200%, we set up a strategy that allowed our exposure to freely move in between the interval of 80% and 120%. Note that this concept is in line with the paper from Moreira and Muir (2017). As a result, if the strategy proposed to go outside of the boundaries, we would simply take the lower or upper bound for outliers.



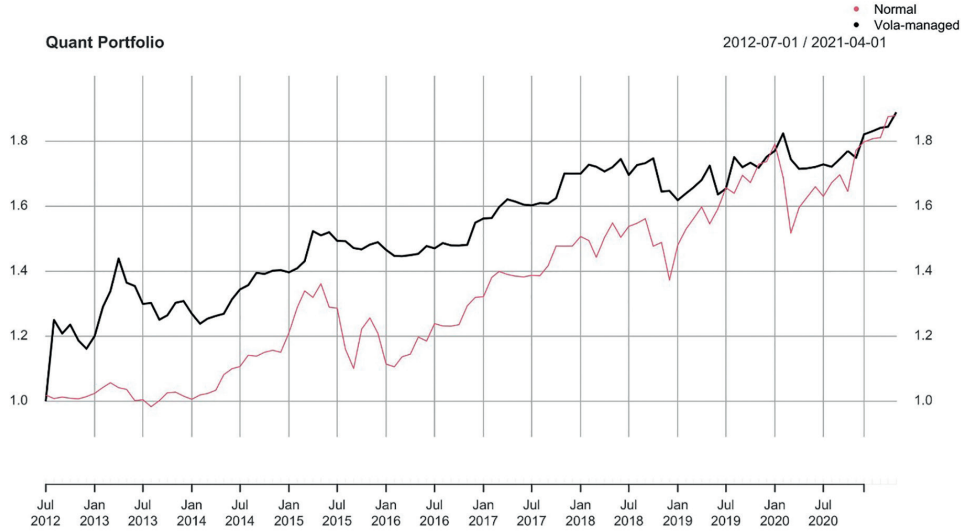



EVOLUTION OF THE FACTOR MARKET






BACKTESTS WITH VARIOUS INDICES




EVOLUTION OF THE QUANT PORTFOLIO



## 4. CONCLUSION

All in all, we were not able to find a persistent pattern to argue in favor of the Volatility-Managed Portfolio strategy. Nonetheless, we view this analysis as a good starting point for future extensions and improvements. One might consider the inclusion of implied volatilities, which we could obtain from option markets (e.g. Martin (2016) as mentioned previously), instead of historical ones. This, however, is something that is to be done soon.

## REFERENCES

Cejnek, G. and Mair, F. (April 23, 2021). Understanding Volatility-Managed Portfolios.

French, K.R. Data Library. Retrieved from https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Harvey, C. R., Hoyle, E., Korgaonkar, R., Rattray, S., Sargaison, M. and van Hemert, O. (June 25, 2018). The Impact of Volatility Targeting.

Hodges P., Hogan K., Peterson J. R., Ang A. (October 2017). Factor Timing with Cross-Sectional and Time-Series Predictors. Journal of Portfolio Management Fall 2017, 44 (1) 30-43.

Liu, F., Tang, X. and Zhou, G. (June 5, 2019). Volatility-Managed Portfolio: Does It Really Work? Journal of Portfolio Management, 46(1), 2019

Martin, I. W. R. (March 28, 2016). What Is the Expected Return on the Market?

Moreira, A. and Muir, T. (October 25, 2016). Volatility-Managed Portfolios. Journal of Finance, Forthcoming.

ANALYST REPORT

# ZZ – Entrepreneurial Group



COHORT 18

# Portfolio Management Program

2020 – 2021 ◆ ZZ-ENTREPRENEURIAL GROUP



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MAY 31ST, 2021

## I. INTRODUCTION

As the first half of our PMP journey ends, we are pleased to present the strategic tool which we have developed during our first year as analysts. The foundation for our project was the fact that we wanted to leave something for the cohorts to come, the same way our managers did when they developed the NDF strategy which we also intend to use going into our Manager year. We have thus implemented our version of the CAPE model. The acronym CAPE stands for Cyclically Adjusted Price-to-Earnings. The main idea of our CAPE model is to use it as a tool to assist us in our deci-

sion-making process, particularly with respect to whether it is appropriate to enter an equity market or not. To be more precise, the tool would indicate which markets have high predicted total equity returns.

We decided to apply our thorough analysis of papers in this field and use the knowledge we gained in programming in R during our technical meetings to come up with the tool which we are about to present.

Thus, we strongly believe that this report will be a useful foundation that will encourage future ZZ generations to go beyond just critical thinking in their decision making. Additionally, our aim is to steepen the learning curve of upcoming analysts using the theory from various renowned resources along with our analytical testing, implications, and further ideas. Even though the theory behind this model is public knowledge, it is likely that there will be new papers that further expand this topic in the near future. This can be seen as an opportunity for further development, as we understand the model may find improvements from our side or the next ZZ cohorts to come.

Additionally, it is worth pointing out that this is a quantitative analytical tool that is used to supplement decision making and therefore is not intended to be used as a trading tool on its own.

## 2. THEORY

The idea of a cyclically adjusted price-to-earnings ratio was popularized in the year 2000 when Robert Shiller published his book Irrational Exuberance.

That is why some refer to CAPE as Shiller's P/E ratio. This ratio is convenient when an individual wants to assess if the market is over- or undervalued, due to the significant correlation (relationship) between the current value of the ratio and the real total return of the market in the subsequent decade. The usefulness was first manifested in 1988 when Campbell and Shiller found this relationship in the US Equity Market during the period of 1981-1987 (Campbell and Shiller, 1988).

The peculiarity of this valuation method is that it uses real EPS usually for a period of one decade to iron out any fluctuations in profits and, thus, gives a better insight of a company's ability to generate sustainable earnings. Intuitively, CAPE is a modification of the popular P/E ratio and the core difference is that Shiller's ratio accounts for inflation. To define it more precisely, CAPE is calculated by dividing the share price by the 10-year average, inflation-adjusted earnings.

The takeaway of this computation is that when the CAPE is low there is a trend of higher returns in the next 10 years. This implies that buying when CAPE is high would lead to rather low returns (Cole, Helwege and Laster, 1996). One might remember that the CAPE was extremely high prior to the Dotcom bubble which led to the US market collapse. Additionally, lower market valuation not only leads to high returns, but also to the lower drawdown risk.

As CAPE sets the asset price with respect to average index earnings in the last decade, and consequently assumes a mean reversion of earnings, it can be assumed that the measurement's ability to predict decreases despite increasing structural changes within the countries index structure (Keimling, 2014). This effect will be considered in the following sections. Nevertheless, CAPE is a more appealing equity valuation criteria relative to the classic P/E ratio, as the P/E ratio tends to be particularly unattractive in years of crisis. This is because it does not consider the expected growth shortly after the crisis.

Additionally, the period of 10 years is selected, as it is important to ensure that the earnings are averaged over more than one business cycle and the inflation-adjustment presents the valuable possibility to also compare profits in periods of high inflation. For all the above-mentioned reasons, we believe that this tool could offer the ZZ Group valuable insight into the valuations of different equity markets.



## 3. MODEL

### 3.1. DATA

Our model uses three panel datasets as input. The first dataset contains monthly values for the cyclically adjusted price-to-earnings ratio, henceforth to be referred to as CAPE, for 39 different countries, as well as for the world equity markets and for European equity markets. The first dataset therefore contains observations on the CAPE values for 41 different regions. The period of the observations varies by region, starting as early as October 1842 for the United States market, and ending in March 2021 for all markets with a few exceptions. This dataset was provided to us by the ZZ Asset Management. The second dataset contains daily total return data for one leading equity market index for each of the 41 regions. Each equity index is chosen in such a way to contain the companies that account for most of the trading and market capitalization within their respective region, while also containing firms from various sectors, important for the local economy. We acquired this data through the Bloomberg Terminal and went as far back in time as there was data available for each index. To ensure consistency for the upcoming regression models, the total returns are calculated based on the local currency equity returns for each country and region. The choice of taking total return in almost all countries allows for a more accurate estimate of returns, since dividends and stock splits are considered. The CAPE data goes further back in time compared to the total return data for almost all regions. The third dataset includes daily price return data on 14 different commodity indices from the three main commodity categories, namely energy, metals, and agriculture. Our R-Script acquires this dataset through the Bloomberg Terminal.

### 3.2. APPROACH – CAPE REGRESSIONS

Upon collecting and formatting the data, we calculate the monthly returns for each equity index, and use those to calculate the monthly annualized 10-years ahead stock returns. This represents the annualized total return that an investor would

receive in the next 10 years, if they invested in the respective equity index and therefore requires having 120 months of return data after the point in time, in which the variable is calculated. For this reason, observations of monthly annualized 10-years ahead stock returns can be derived for each month starting from the beginning until February 2011. Each time period denoted by t is a separate month and has a unique CAPE value for each country or region. The regression is therefore at the country level and takes the following form:

$$R_{t+120} = \alpha + \beta CAPE_t + \varepsilon_t$$

When running the regression from the period of 2001 until 2011 we obtain a beta coefficient estimate that is significant at the 1% level for 40 out of the 41 regions under standard errors that are robust to heteroskedasticity. Upon obtaining significant parameter estimates, we use those to calculate the model's expected annualized 10-years ahead total stock returns for each equity index. Figure 1 onthe next page plots the development of the Shiller Cape Ratio for six different countries as a function of time.

### 3.3. CALCULATIONS

To test the model's forecast performance, we divided the complete dataset into an in-sample period, to be used for the initial parameter estimation as well as model selection, and an out-of-sample period. We decided to set the in-sample period to the ten years between 2001 and 2011. This ten-year period is sufficiently large to cover roughly two business cycles on average but also not so large that it contains a consistent fall in interest rates, which could be affecting equity valuations. The out-of-sample period is therefore the ten years after 2011. In this way the backtest allowed us to first see what 10-year ahead stock return the model would predict for each equity market and compare this to the actual realized 10-year ahead stock return. We make sure to note that every piece of information used in the in-sample version of the model would have been available to someone who may have wanted to run the model in 2011. Figure 2 shows the results of this out-of-sample test (next page).

Figure 2 on page 99 first presents a comparison of the predicted versus realized returns for each region, followed by the model absolute deviation, which we define as the difference between the predicted annualized 10-years ahead returns and the actual realized 10-years ahead returns. A smaller absolute value for the model absolute deviation thus implies that the CAPE model's predicted return was closer to the actual realized return. As can be seen from Figure 2 38 out of the 41 regions had a model absolute deviation of less than 5% and 27 had a model absolute deviation of less than 2%. The model predicted a lower than realized return in the United States (10.18% versus 13.88%) and in Japan (9.22% versus 12.52%). This could potentially be due to the unconventional and expansionary monetary policies pursued respectively by the Federal Reserve and the Bank of Japan during the 2001-2011 period, which most likely had the effect of further supporting equity valuations.

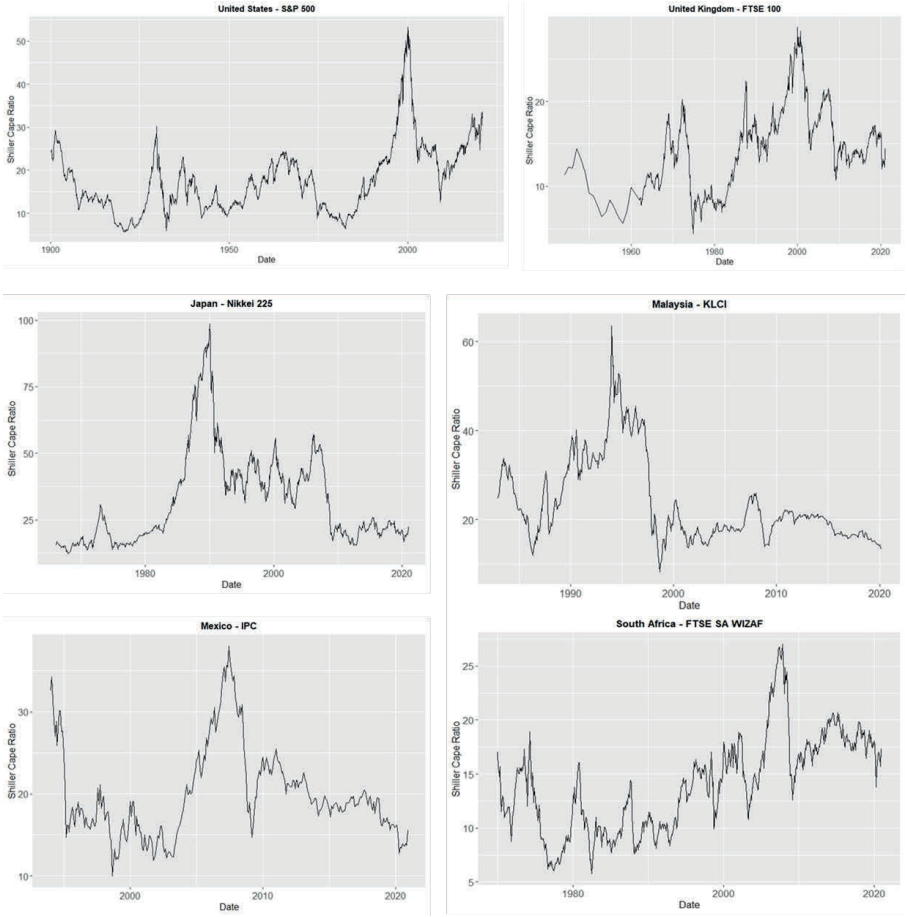


FIGURE 1 ILLUSTRATES THAT THE SHILLER CAPE RATIO TENDS TO PEAK BEFORE STOCK MARKET CRASHES, NOTABLY 1929 AND 1999 IN THE UNITED STATES, AS WELL AS JAPAN IN 1990.



### 3.4. RESULTS

Figure 3 on page 100 presents the CAPE regression plots of nominal total stock returns on the Shiller Cape Ratio over the whole period of available data for each of six countries. We have chosen these countries due to having a significant equity exposure to them in our portfolio, such as is the case with the United States and Mexico, or because of interest in entering a long equity position in them, as is the case with Japan. Consistent with Davis, Aliaga-Díaz, Ahluwalia and Tolani, 2018, the figure shows that future long-run stock returns in these six countries tend to move inversely with the CAPE ratio over time as indicated by the downward-sloping regression line. The regression betas for all six countries are significant at the 0.1% level even when using heteroskedasticity robust standard

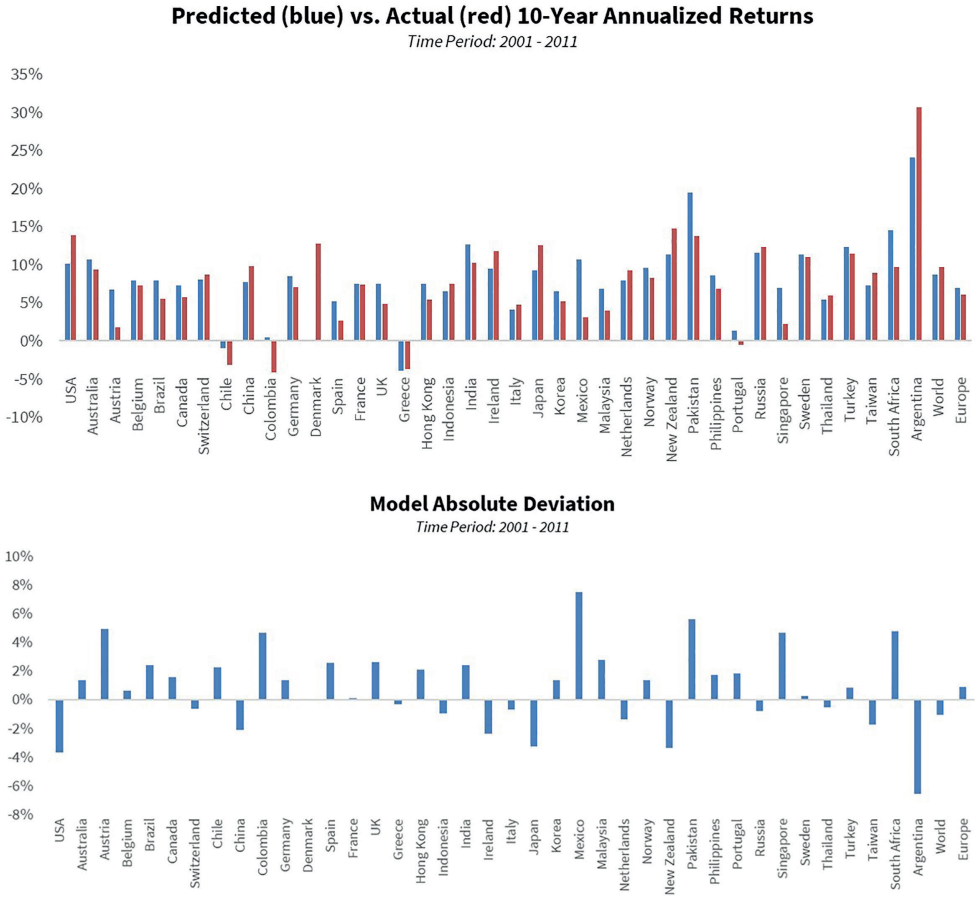


FIGURE 2



errors. Figure 3 further shows how much of the time-series variation in 10-year ahead nominal total stock returns was explained by the model for each of the six countries. This figure, as measured by the adjusted R-squared is between 45% for the US and 65% for Malaysia. The number of data points also varies due to data availability, ranging from 312 for South Africa to 1,118 for the United States. The model additionally outputs correlation between the 14 previously mentioned commodity indices and the total return performance of each equity index.

## 4. ROBUSTNESS ASSESSMENT

We consider heteroskedasticity in our CAPE model. Heteroskedasticity is said to occur when the variance of the error term conditional on the regressor, in our case the CAPE variable, is no longer con-

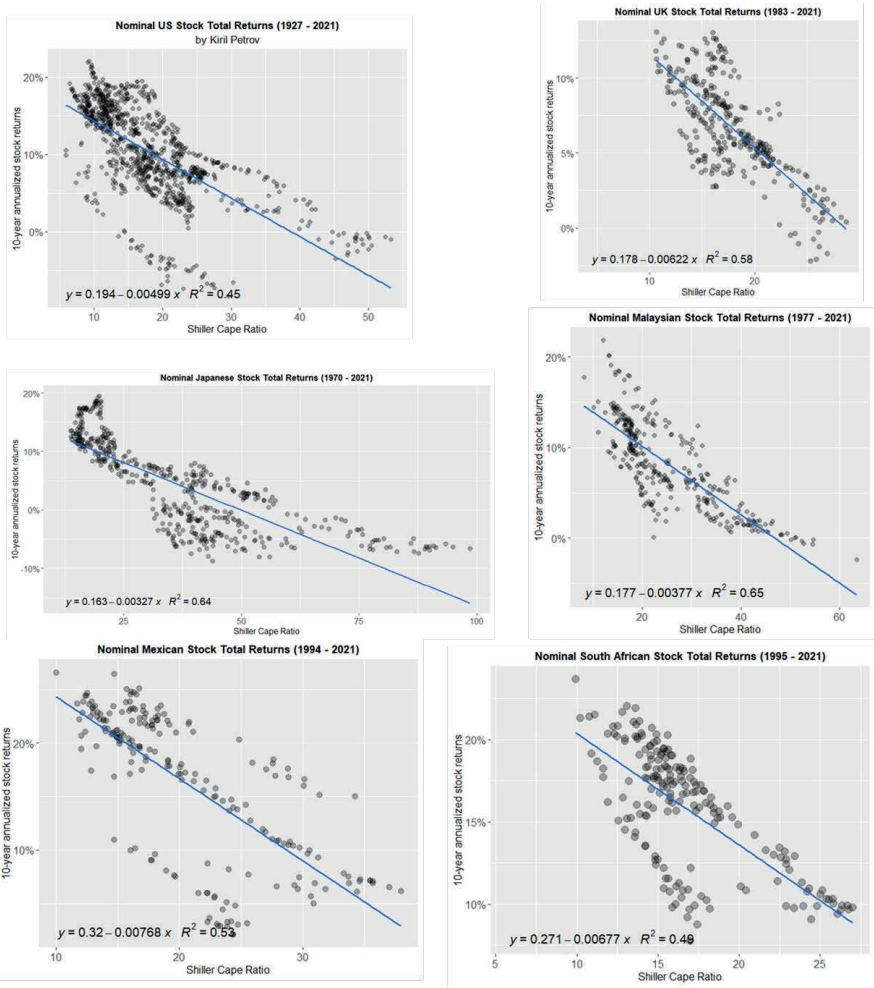


FIGURE 3

stant. Under heteroskedasticity, the beta coefficient estimate remains unbiased, but the OLS estimator is no longer the best linear unbiased estimator (BLUE). This is because a crucial OLS assumption, namely that all residuals are drawn from a population with a constant variance is then violated. As a result, an OLS model may produce biased estimators of variance, such as biased t-statistics and confidence intervals. To correct for this, we run the Brausch-Pagan test for each CAPE regression. The results then indicate that 22 out of the 41 region regressions contain sufficient evidence to reject the null hypothesis of homoskedasticity at the 5% confidence level. We then estimate heteroskedasticity robust standard errors,

which we implement in all our CAPE regressions. As a result, this implies that our estimators of the variances are valid.

An important feature of the CAPE Regressions is the presence of autocorrelation. This autocorrelation is first evident in the response variable, namely the 10-years ahead total stock returns. As previously described, for each month this return is calculated based on the returns over the next 120 months and annualized. As a result, each following month contains returns based on the same 119 observations as the previous. This autocorrelation furthermore extends to the residuals of each regression model and goes beyond the 25th order, which implies that each residual is significantly positively correlated with its lag of the 25th order and beyond. One of the main assumptions of the OLS estimator is therefore violated, as we have $\mathbf{Cov}(\boldsymbol{\varepsilon_i}, \boldsymbol{\varepsilon_j}) \neq \mathbf{0}, \mathbf{for\ i} \neq \mathbf{j}$. As a result of this, the OLS estimator is still unbiased, but no longer BLUE.

We show that autocorrelation disappears after we include a lagged version of the response variable as a regressor. This results in the following regression specification:

$$\boldsymbol{R_{t+120} = \alpha + \beta_0 CAPE_t + \beta_1 R_t + \varepsilon_t}$$

Figure 4 (next page) shows the autocorrelation functions for the residuals of the regression residuals of the six previously mentioned countries after the addition of this lagged variable.

As Figure 4 shows, almost all lags of the regression residuals are within the confidence intervals for all six countries except for Malaysia. This suggests that there is no significant autocorrelation of any order, which implies that our model's estimators of variance are robust to autocorrelation.

Furthermore, the model specification that is robust to autocorrelation shows a better out-of-sample performance than



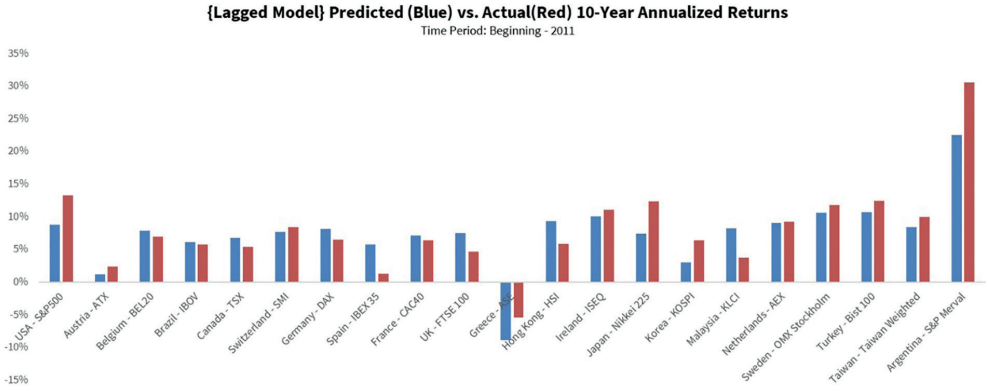


FIGURE 5

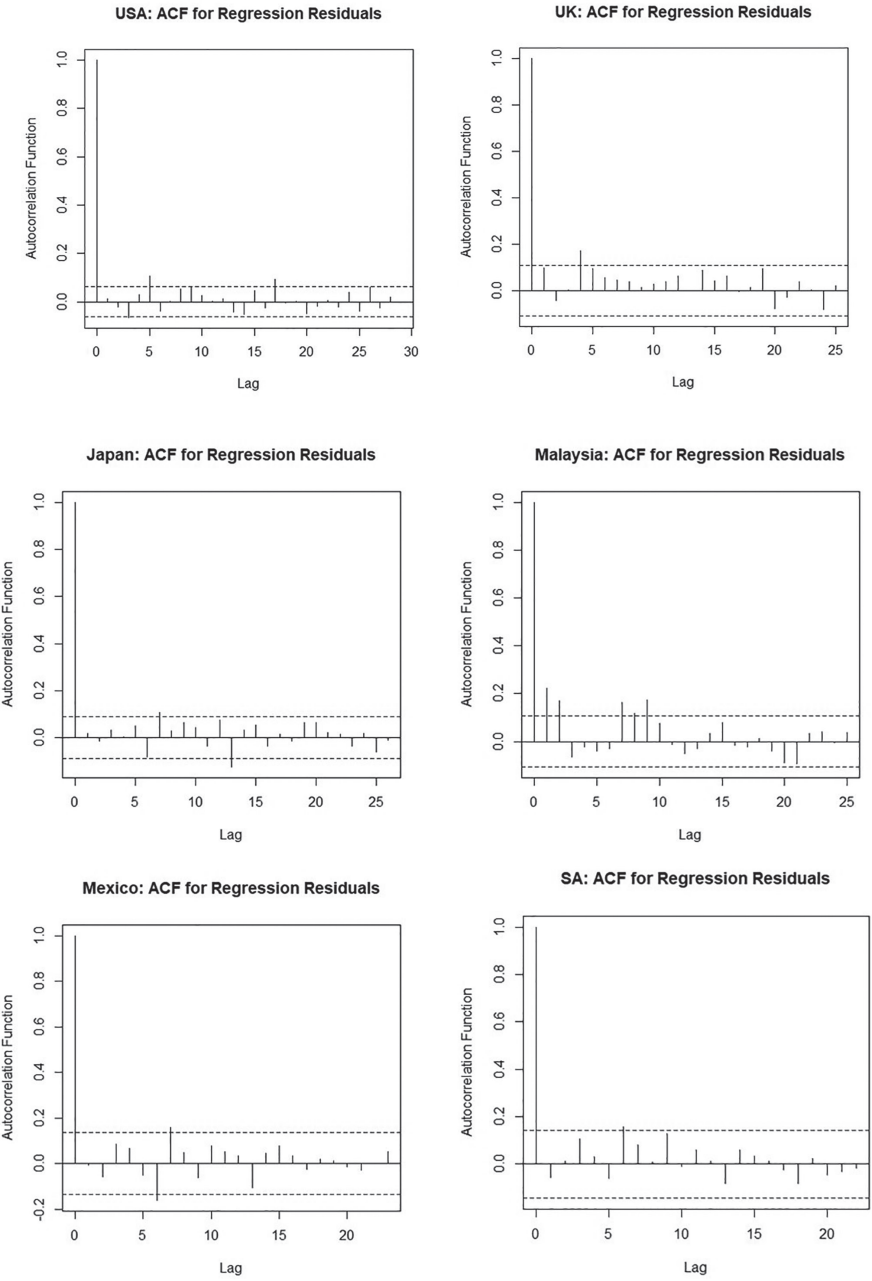
USA: ACF for Regression Residuals
UK: ACF for Regression Residuals
Japan: ACF for Regression Residuals
Malaysia: ACF for Regression Residuals
Mexico: ACF for Regression Residuals
SA: ACF for Regression Residuals
Autocorrelation Function
Lag

FIGURE 4

the standard model specification, as can be seen in Figure 5:

## 5. APPLICATION OF THE MODEL

As of May 2021, a significant part of our portfolio positions is in fixed income products within emerging markets. Our mid-term outlook for emerging markets however is, in general, not positive, as dragging lockdowns, persistent spikes in COVID infections and fear of longer-term inflation in the United States, which might lead to a tapering of the current asset purchase program carried out by the Federal Reserve, keep pressing those economies. For the above reasons we were hesitant with adding fixed income exposure into our portfolio. Instead, we decided to implement a more targeted approach into undervalued and promising emerging market equities, which motivated the need to develop the CAPE tool.

Our desire to position our portfolio more towards equities was motivated by two factors. The first is that equities benefit directly from an increase in earnings, as opposed to fixed income where a higher return depends mostly on accepting more risk. The second factor is that equity markets, particularly those with lower duration equities, should not be impacted as much by a possible raise in interest rates, or higher inflationary pressures, especially when the underlying components are already undervalued. Our CAPE model thus provides us with the quantitative edge that discretionary investment decisions sometimes lack, by allowing us to understand which investment opportunities are worth pursuing. Additionally, we have a quite bullish view on commodities as we believe there are several factors in their favor. After deciding on investing in a particular emerging market from the equities side with the goal of increasing our exposure to a particular commodity or basket of commodities, we may use the CAPE tool to derive conclusions not only about the possible under- or overvaluation of the given market but also about the expected 10-year ahead annualized total returns.

## 6. IMPROVEMENT OF THE MODEL

One of the characteristics of the CAPE model is that it considers a valuation metric exclusively for equity securities. This means it does not take into consideration what other asset classes, particularly bonds, are simultaneously yielding. Finance theory predicts however that investors may switch from fixed income to equities whenever bond yields are far too low for fund managers to effectively meet their target returns. Such may have been the case in May 2021 when 10-year US Treasuries were only yielding 1.62%. Considering inflation means that the real yield on Treasuries is negative. Simultaneously the Shiller CAPE Ratio for US equities stands at 37.04, representing the highest equity valuations since 2001 and a 35.54% growth from one year ago. Under the original CAPE model US equities would thus appear overvalued and, under the mean reversion theory, one would assume that 10-years ahead total equity returns would be lower than they have been over the last decade. This may not be a fair conclusion, because one should

consider the returns that equities offer relative to fixed income investments.

For the above reasons we intend to extend the model by considering Shiller's Excess CAPE yield. This formula takes the inverse of each equity market's CAPE value, effectively the Shiller earnings yield, which measures the profit an equity market is delivering for each unit of currency that an investor has paid. It then subtracts the real, or inflation-adjusted, yield on 10-year government bonds. Shiller's Excess CAPE yield thus measures the margin that stocks are paying relative to bonds. Based on the S&P 500 CAPE ratio of 37.04 this would imply that US equities are yielding a mere 2.7% as of May 2021. When one subtracts, however, the negative real yield on 10-Year Treasuries, we find that the excess CAPE yield stands at almost 5%, which provides a stronger explanation for the relatively high equity valuations of US companies.



## 7. CONCLUSION

In conclusion, after extensive analysis and back tests, we found that our tool is to an extent successful at finding undervalued equity indices that tend to perform well over the next decade. Looking at our Predicted vs Actual 10-Year Annualized Returns in Figure 2, it is clearly visible that our model produces accurate results for certain countries. Such performance is further confirmed when we analyze the Model's Absolute Deviation, where we find that 92% of the regions had a Model Absolute Deviation of less than 5% and 66% had a MAD of less than 2%. In two markets, namely the United States and Japan, the model predicted lower than realized returns. We believe this discrepancy is, at least in part, likely caused by the unconventional monetary and fiscal policies by the Federal Reserve and the Bank of Japan during the analyzed period (2001-2011). Such unconventional policies create favorable conditions for equity valuations to stretch as investors find themselves reaching for yield.

The model's predictive accuracy increases when we adjust for autocorrelation. We achieve this by adding a lag of the dependent variable and including it as a regressor. As result, we find that the residual lags for 5 out of 6 of the tested countries were within their confidence intervals, indicating no significant evidence for the presence of autocorrelation.

The lagged model's Predicted vs Actual 10-Year Annualized Returns (Figure 5) shows a better out-of-sample performance than the standard model (Figure 2), as measured by lower absolute values of the Model Absolute Deviation. We will keep developing our model going into our manager year and one of the first improvements we wish to undertake consists of extending this model to consider Shiller's Excess CAPE yield, as we find this improvement highly relevant for a period such as now when real bond yields have fallen below zero in many markets around the world.

## REFERENCES

Campbell, J. and Shiller, R., 1988. Stock Prices, Earnings and Expected Dividends.

Cole, K., Helwege, J. and Laster, D., 1996. Stock Market Valuation Indicators: Is This Time Different?. Financial Analysts Journal, 52(3), pp.56-64.

Davis, J., Aliaga-Díaz, R., Ahluwalia, H. and Tolani, R., 2018. Improving U.S. Stock Return Forecasts: A "Fair-Value" CAPE Approach. The Journal of Portfolio Management, 44(3), pp.43-55.

Keimling, N., 2014. CAPE: Predicting Stock Market Returns. [Accessed 18 May 2021].

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