Managing political risk in international portfolios

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Abstract

We show that internationally diversified portfolios carry sizeable political risk premia. Using a portfolio selection model with tail risk, we obtain political efficient frontiers from skewed return distributions to manage political risk, and design an inference test to draw conclusions. We find that politically hedged international portfolios of US investors realize performance gains against a broad market index (and other benchmarks). Currency hedging does not eliminate political risk. The diversification gains increase for long-horizon investors. Qualitatively identical results are obtained for Eurozone and Japan. Our findings inform the home equity bias puzzle literature, and are robust to several model specifications.

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1 Introduction

We show that political risk is a significant determinant of risk and return in internationally diversified portfolios, and ask what happens when we hedge it. Political uncertainty is known to affect the financial markets (Baker, Bloom, and Davis, 2016; Pástor and Veronesi, 2013), but, with the exception of Cosset and Suret (1995), international diversification studies focus on currency risk, since political risk is considered country-specific and, hence, diversifiable. Recently, political risk spillovers were introduced in asset pricing models by Kelly, Pástor, and Veronesi (2016) and documented empirically by Liu and Shaliastovich (2021), implying that political risk may not be diversifiable. This raises the following questions: Do international portfolios carry a political risk premium? If yes, how to manage the systematic component of political risk? And, importantly, do diversification benefits persist when hedging political risk? We provide affirmative answers.

Gains from international diversification have long been documented (Grubel, 1968; Levy and Sarnat, 1970; Solnik, 1974), and they persist even when hedging currency risk.[1] We show that political risk is another significant factor in international portfolios, especially when emerging markets take center stage (Christoffersen, Errunza, Jacobs, and Langlois, 2012; De Roon, Nijman, and Werker, 2001). We use a novel mean-to-CVaR portfolio optimization model, based on a performance ratio for stable distributions (Martin, Rachev, and Siboulet, 2003), and design an asymptotic inference test, and show that significant performance gains from international diversification come with increasing exposure to political risk. We find that hedging political risk erodes but does not eliminate gains, over the home index or an equally weighted portfolio, and the gains persist even when hedging currency risk too. This is a new result in the literature. Our empirical tests on a sample of 42 developed and emerging markets spanning 1999–2019, find that politically-hedged portfolios of US, Eurozone, and Japanese investors achieve performance ratios about twice that of the index or the equally weighted portfolio.

Gala, Pagliardi, and Zenios (2020) provide evidence that political risk is characterized by a global component, alongside country-specific shocks, that is priced in international stock returns. They establish a link between the factor structures of country political ratings and portfolios sorted on such ratings, uncovering a priced global political risk factor (P-factor). This supports an APT interpretation that political risk is a distinct factor from market and currency risk factors. This distinctness motivates our research.

We start by showing that international diversification increases the exposure to political risk measured by country ICRG ratings (PRS Group, 2005), or exposure to the

[1] E.g., (Ang and Bekaert, 2002; Black, 1989; Boudoukh, Richardson, Thapar, and Wang, 2019; Campbell, Serfaty-De Medeiros, and Viceira, 2010; Driessen and Laeven, 2007; Glen and Jorion, 1993; Grubel, 1968; Levy and Sarnat, 1970; Perold and Schulman, 1988; Topaloglou, Vladimirou, and Zenios, 2002).

P-factor β_P estimated through time-series regressions of country excess returns on the factor, controlling for market risk.[2] We report in Table 1 the ICRG ratings and political premia of the home country index I, the equally weighted portfolio EW (DeMiguel, Garlappi, and Uppal, 2009), and the international portfolio with maximum Sharpe ratio SR. Results are shown for US (Panel A), Eurozone (Panel B), and Japanese (Panel C) investors. International portfolios have lower ICRG ratings and higher β_P, with economically significant political premia. The SR portfolio of the US investor has political risk premium 1.84% p.a. compared to market premium of 4.96% p.a. for the index, for the Eurozone the political premium is 1.34% compared to 4.99% for the market, and for Japan it is 2.05% compared to 3.93% (p-values 0.00). SR portfolios realize increases in annualized Sharpe ratio of 0.26–0.61 (p-values 0.01), which are about double the Sharpe ratio of the I or EW portfolio, but carry material political risk. SR portfolios that diversify only in emerging markets carry twice as large political premia —3.57% for US and Japan, 3.89% for Eurozone— commensurate with the higher political risk of these markets.[3]

[Insert Table 1 Near Here]

Managing portfolio political risk entails a tradeoff between high expected return, low risk, and high political rankings. Risk and return tradeoffs can be summarized by a performance ratio (Farinelli et al., 2008), such as the Sharpe ratio, and politically sensitive investors face an additional tradeoff between performance and the political risk exposure of their portfolio. In this respect, our paper is close to the recent work of Pedersen, Fitzgibbons, and Pomorski (2021) for ESG portfolio management.

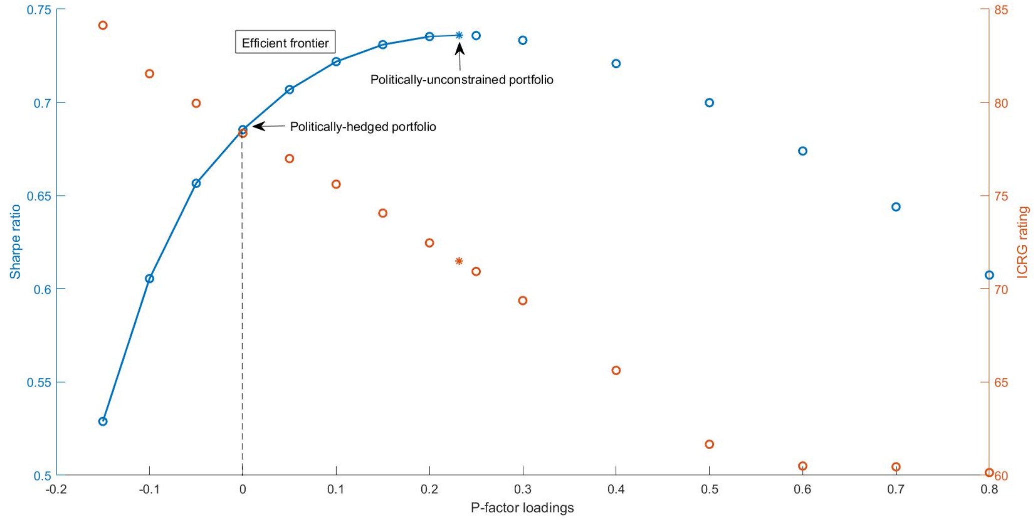
In Figure 1 we report the performance ratio for a US investor, obtained from mean-variance (MV) tangency international portfolios with increasing ICRG ratings, and observe a monotonic increase with higher political ratings. However, when displaying the corresponding political beta of the portfolios we note a hump-shaped relationship. The SR portfolio of Table 1 (Panel A), with ICRG$^* = 72$ and $\beta_P^* = 0.23$, achieves the largest performance ratio. This is the politically unconstrained portfolio in the sense that no portfolio with larger political beta will be selected by Sharpe maximization investors who are indifferent to political risk. As the ICRG rating increases the portfolio political beta is reduced and Sharpe decreases, consistently with the efficiency hypothesis that lower risk implies lower expected returns. These portfolios are on the efficient *political beta β_P-SR frontier*, shown as the solid curve. For lower ICRG ratings, the political risk is increased, reflected in larger portfolio political betas, but the performance ratio

[2] Appendix Figure D1 shows that country political betas line up with their average excess returns, corroborating the risk-based view of political effects on international stock markets of (Gala et al., 2020).

[3] Witness the lower average ICRG ratings of emerging (67.30/100) vis-à-vis developed (83.29/100) markets or Ifo World Economic Survey (Becker and Wohlrabe, 2007) policy ratings (30.34/100 vs 46.09/100) or politics ratings (4.85/9 vs 6.80/9), with higher average political betas by 0.33.

Figure 1 – The political frontier of international portfolios

This figure illustrates the tradeoff between performance ratio (Sharpe) and political risk in internationally diversified portfolios. Portfolio political risk is proxied by the portfolio ICRG ratings (red), and is measured by the portfolio political beta (blue). The zero political beta portfolio is hedged from political risk. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019.



also decreases, with increasing political risk not compensated with higher returns. These portfolios are inefficient.

Politically sensitive investors trade off political risk with rewards. Some investors may seek exposure to political risk to increase expected returns. Risk-averse investors may want to reduce political exposure and select a portfolio on the efficient frontier depending on their indifference curve, but the frontier is derived from market characteristics and is independent of investor preferences. We use the political beta to measure country political risk, instead of political ratings as proxies, to identify a zero β_P portfolio. This is the politically hedged portfolio, and we ask if diversification benefits persist for this portfolio. However, our approach generates the full political efficient frontier, and we will show that it is inefficient to screen ex ante countries for their political risk.

Thus far we have used the standard Sharpe performance ratio which applies under normality assumptions. Deviations from normality are significant in emerging markets that are central to international diversification (Ghysels, Plazzi, and Valkanov, 2016), and political risk is particularly fat-tailed (Gala, Pagliardi, and Zenios, 2020), and to answer our research question we first make a methodological contribution to overcome normality.[4] We use the CVaR risk measure (Artzner, Delbaen, Eber, and Heath, 1999)

[4]Jarque-Bera tests in the data section reject normality for all but three countries in our sample of

to arrive at a mean-to-Conditional-Value-at-Risk (MtC) portfolio selection model, using a performance ratio from the literature of stable distributions (Martin, Rachev, and Siboulet, 2003). We show that it satisfies second order stochastic dominance, so that maximum MtC portfolios are preferred by the class of investors with concave and non-increasing utility functions. This allows us to abstract from investor preferences. We also derive the limiting distribution of an MtC statistic and propose a new inference test on the equality of multiple MtC ratios, akin to Wright, Yam, and Yung (2014) for Sharpe. This allows us to compare portfolios with different hedging strategies. The model is formulated as a linear program, without the need to estimate an (assumed) fat-tail distribution, and allows for transaction cost optimization.[5]

Our main empirical contribution is to document a statistically and economically significant political risk premium in internationally diversified portfolios, and to show that diversification gains are preserved when political risk is managed. We consider the zero political beta portfolio, and, remarkably, find that it still realizes significant gains in MtC (and Sharpe) ratios over the index and EW portfolios, and when also hedging currency risk. Gains are achieved with no-short-sales constraints, and are larger for long-horizon investors. The results hold for the US, Eurozone, and Japan as home countries.

In addition to the main empirical finding, we shed light on some other relevant issues.

First, diversification gains come from expected returns compensating for tail risk. This can be of concern to investors who view international diversification as a means to reduce risk. Viceira and Wang (2018) show that long-term investors can achieve significantly larger risk reduction through international diversification when the cross-country return correlation is due to correlated discount news than due to correlated cashflow news. Gala, Pagliardi, and Zenios (2020) establish that political variables impact return innovations through both cashflow and discount rate channels, thus raising an empirical question whether long-horizon investors benefit from political risk, so that hedging it may hurt them. We follow Asness, Israelov, and Liew (2011); Christoffersen, Errunza, Jacobs, and Langlois (2012) and show larger gains for long-horizon investors with political risk hedging, with gains realized much earlier than without hedging.

Second, we inform the literature on the equity home bias puzzle (French and Poterba, 1991). Dahlquist, Pinkowitz, Stulz, and Williamson (2003) show that country character-

22 developed economies and 20 emerging markets. Nevertheless, MV is the workhorse in international diversification (Bekaert and Urias, 1996; Cosset and Suret, 1995; De Roon, Nijman, and Werker, 2001; Driessen and Laeven, 2007; Errunza, Hogan, and Hung, 1999; Glen and Jorion, 1993; Grubel, 1968; Levy and Sarnat, 1970; Li, Sarkar, and Wang, 2003; Perold and Schulman, 1988; Viceira and Wang, 2018).

[5]Methodologically, we could use expected utility maximization for portfolio selection under skewed returns, but this would raise questions about the robustness of our findings to the choice of risk aversion, while our findings hold for a broad class of investors. Also, the linear programming formulation of MtC has a computational advantage over the non-linear program of expected utility maximization.

istics related to political risk (and corporate governance) limit investor protection and can tilt internationally diversified portfolios towards the home market, and Guidolin and Timmermann (2008) point out that political risk applies more to emerging markets and is a less obvious explanation of limited diversification among developed economies. We show that diversified portfolios are exposed to political risk in both developed and emerging markets, and political hedging tilts portfolios towards the home country, or from emerging into developed markets. This lends empirical support to Dahlquist et al. (2003), in line with Guidolin and Timmermann (2008). However, the tilt does not match the market data, and we can rule out political risk as an explanation of the puzzle.

As an aside, we contribute to a debate on the diversification benefits subject to no-short-sales (NSS) frictions in emerging markets. De Roon, Nijman, and Werker (2001) use an asymptotic MV spanning test and find that this friction eliminates gains from diversification into emerging markets for US investors, but Li, Sarkar, and Wang (2003) account for small sample bias and find gains. We use a model with higher-order moments and a consistent inference test, on a sample of more countries over a wider time span, and find results in line with De Roon et al. Also, time-varying market integration may erode international diversification benefits, and, using data from 1999 when market integration increased significantly (De Jong and De Roon, 2005), we add to Ang and Bekaert (2002); Christoffersen, Errunza, Jacobs, and Langlois (2012) who document gains when accounting for higher order moments, by contributing the political risk hedging dimension.

2 The portfolio selection model

We develop the portfolio selection model with a political risk constraint. We define MtC efficient portfolios, prove second order stochastic dominance consistency, and obtain the tangency portfolio using linear programming; see Appendix A for background material.

2.1 Mean-to-CVaR portfolios

Portfolio return $\tilde{r}_p = \tilde{r}^\top x$ is a function of the vector of portfolio weights $x \in \mathbb{X} \subset \mathbb{R}^n_+$, and the random vector $\tilde{r} \in \mathbb{R}^n$ of asset returns with expected value $\bar{r}$. $\mathbb{X}$ is the set of feasible portfolios. Assuming a risk-free asset with return r_f, the investment problem is to decide the allocation of wealth between the risk-free and the risky portfolio. If $y \geq 0$ is the proportion in the risky portfolio, the return of the *complete* portfolio is

$$\tilde{r}_c = y\tilde{r}_p + (1 - y)r_f. \tag{1}$$

We use CVaR as the risk criterion in portfolio selection to account for tail risk. CVaR is coherent (Artzner, Delbaen, Eber, and Heath, 1999), and, for discrete distributions, it can be optimized as a linear program (Rockafellar and Uryasev, 2002). Due to these advantages CVaR is widely used,[6] and minimizing CVaR for different target expected return, $\bar{r}^\top x \geq \mu$, we obtain efficient frontiers in mean-CVaR (MC) space.

We can easily establish the following proposition:

Proposition 2.1. *For any $y > 0$, and at a given confidence level $\alpha \in (0,1)$,*

$$\mathrm{CVaR}_\alpha(\tilde{r}_c) = y\mathrm{CVaR}_\alpha(\tilde{r}_p) - (1-y)r_f. \tag{2}$$

Proof. See Appendix A.1 □

Solving (2) for y and substituting in (1) we get

$$\tilde{r}_c = (1 + \frac{\tilde{r}_p - r_f}{\mathrm{CVaR}_\alpha(\tilde{r}_p) + r_f})r_f + \frac{\tilde{r}_p - r_f}{\mathrm{CVaR}_\alpha(\tilde{r}_p) + r_f}\mathrm{CVaR}_\alpha(\tilde{r}_c). \tag{3}$$

Taking expectations of both sides, and writing all terms as excess returns, we obtain

$$\mathbb{E}(\tilde{r}_c) = (1 + \frac{\mathbb{E}(\tilde{r}_p - r_f)}{\mathrm{CVaR}_\alpha(\tilde{r}_p - r_f)})r_f + \frac{\mathbb{E}(\tilde{r}_p - r_f)}{\mathrm{CVaR}_\alpha(\tilde{r}_p - r_f)}\mathrm{CVaR}_\alpha(\tilde{r}_c). \tag{4}$$

The coefficient of the risk term is the *mean-to-CVaR ratio*

$$\mathrm{MtC}_\alpha = \frac{\mathbb{E}(\tilde{r}_p - r_f)}{\mathrm{CVaR}_\alpha(\tilde{r}_p - r_f)}. \tag{5}$$

MtC is computed for a given α, and henceforth we drop the subscript. MtC is a performance ratio that measures the expected excess return per unit of risk in (4), like the Sharpe ratio $S_p = \frac{\mathbb{E}(\tilde{r}_p - r_f)}{\sigma(\tilde{r}_p - r_f)}$ in the capital market line of CAPM, $\mathbb{E}[\tilde{r}_c] = r_f + S_p\sigma(\tilde{r}_c)$, where p denoted the *tangency* portfolio on the MV efficient frontier.[7]

We maximize the MtC ratio to compute the tangency portfolio in MC space,

$$\mathrm{MtC}^* = \max_{x \in \mathbb{X}} \frac{\mathbb{E}(\tilde{r}_p - r_f)}{\mathrm{CVaR}(\tilde{r}_p - r_f)}. \tag{6}$$

[6] Financial applications of CVaR optimization include, among others, Alexander and Baptista (2004); Gotoh, Shinozaki, and Takeda (2013); Huang, Zhu, Fabozzi, and Fukushima (2008); Kibzun and Kuznetsov (2006); Mausser and Romanko (2018); Topaloglou, Vladimirou, and Zenios (2002); Xiong and Idzorek (2011), and Basel III shifted to CVaR. CVaR optimization also finds applications in the news vendor problem, radiation therapy treatment planning, carbon markets hedging, water resources and energy management; see, e.g., (Zenios, 2007, ch. 4).

[7] The ratio of expected return to CVaR was proposed as a tail-adjusted return ratio for stable distributions (Martin, Rachev, and Siboulet, 2003), and it satisfies monotonicity, quasi-convexity, and scale invariance (Cheridito and Kromer, 2013).

From the tangency portfolio every other MC efficient portfolio can be generated as a linear combination with the zero-risk intercept of eqn. (4) at MtC^*.

Model (6) is solved as a linear program when asset returns take discrete values from a finite set of scenarios, see Appendix A.2. For NSS portfolios we define the constraint set

$$\mathbb{X} = \{x \in \mathbb{R}^n \mid x \geq 0, \sum_{i=1}^{n} x_i = 1\}, \tag{7}$$

and for covered short positions we have

$$\mathbb{X}_S = \{x \in \mathbb{R}^n \mid x = x^+ - x^-, \, x^+ \geq 0, x^- \geq 0, \sum_{i=1}^{n} x_i^+ - x_i^- = 1, \sum_{i=1}^{n} x_i^- \leq 1\}. \tag{8}$$

We now add political risk considerations. A popular approach for managing risk preferences is through ex ante *screening* of undesirable securities (Pedersen, Fitzgibbons, and Pomorski, 2021). In the case of political risk, this entails creating portfolios after excluding assets with low political ratings. However, screening removes markets with high political risk that may be compensated with high MtC compared to the sample average, or that are hedges against other markets. Instead, politically sensitive investors can trade off political risk with the MtC ratio by constraining portfolio political beta

$$\beta_P^\top x \leq \bar{\beta}. \tag{9}$$

This constraint is binding if $\bar{\beta}$ does not exceed the political beta of the unconstrained portfolio β_P^*. For lower values, the political risk is reduced, and for $\beta_P^\top x = 0$ it is hedged.

Solving (6) subject to (9) for different values of $\bar{\beta}$ we trace the political efficient frontier in MC space, akin to the MV frontier of Figure 1.

2.2 Second order stochastic dominance consistency

MtC optimal portfolios satisfy second order stochastic dominance (SSD) consistency. This allows us to select portfolios without specifying a utility function, beyond that it belongs to the class of increasing concave functions, and provides the justification for using the model to select and compare portfolios in our empirical tests.

Theorem 2.1 (Second order stochastic dominance consistency of MtC portfolios)**.** *Let* $\mathbb{X}_+$ *denote the space of all feasible portfolios with positive numerator and denominator of the MtC ratio. Then* MtC *is SSD consistent for all portfolios in* $\mathbb{X}_+$.

Proof. We use the notions of stochastic dominance of random variables and SSD consistency of risk measures, defined in Appendix A. Let us assume that portfolios x_1 and x_0 belong to $\mathbb{X}_+$, and x_1 dominates x_0, i.e., $\tilde{r}_{x_1} \succeq_{SSD} \tilde{r}_{x_0}$ or $\tilde{r}^e_{x_1} \succeq_{SSD} \tilde{r}^e_{x_0}$ where r^e denotes the excess returns over risk-free. This implies that $E(\tilde{r}^e_{x_1}) \geq E(\tilde{r}^e_{x_0}) > 0$ (Whang, 2019, Theorem 1.1.5), and, equivalently, $\mathbb{E}(\tilde{r}_{x_1} - r_f) \geq \mathbb{E}(\tilde{r}_{x_0} - r_f) > 0$. We also have that CVaR is SSD consistent (Ogryczak and Ruszczyński, 2002, Theorem 3.2), which implies $0 < \text{CVaR}(\tilde{r}_{x_1} - r_f) \leq \text{CVaR}(\tilde{r}_{x_0} - r_f)$. Therefore the ratio of CVaR-to-mean for portfolio x_1 is less than or equal to CVaR-to-mean ratio of portfolio x_0. Hence, the inverse of MtC ratio is consistent with SSD. Since we assume the risk measure to be positive, we replace $\rho(\tilde{X}) \leq \rho(\tilde{Y})$ with $\frac{1}{\rho(\tilde{Y})} \leq \frac{1}{\rho(\tilde{X})}$, so that MtC is SSD consistent. □

2.3 Empirics of MtC portfolios

In addition to SSD consistency and a tractable linear programming formulation, MtC optimization generates positively skewed portfolios compared to MV. The difference is more pronounced when investing in emerging markets, further justifying the use of MtC in international portfolio selection. We block bootstrap with replacement (block size 6) the time series of returns to generate 5000 samples, and re-optimize MtC and SR to obtain a distribution of portfolio skewness.[8] In Figure 2 (Panels A–B), we plot the skewness of the MtC and SR optimal portfolios for developed and emerging markets, respectively. We observe that MtC portfolios satisfy the investor preference for positive skewness (Mitton and Vorkink, 2007), and this is more pronounced for emerging markets. The skewness for developed markets is -0.57 with SR but increases to -0.42 with MtC, and for emerging markets the value increases from -0.26 to -0.05.

The model also appears more robust than MV. We solve an identical problem using MC and MV to minimize their respective risk measure for a target expected return, and compute the standardized error of the non-optimized risk measure from its optimal value.[9] The errors are zero for expected return maximization, but for risk minimization we observe from Figure 2 (Panel C) that MC has lower errors than MV. The tangency MtC optimal portfolio has a variance that is 17% higher than the optimum, whereas the SR portfolio has a CVaR that is 44% higher than the optimum. Similar results are obtained when solving identical problems using only developed or emerging markets.[10]

[Insert Figure 2 Near Here]

[8]Throughout the paper we set $\alpha = 0.95$, and take discrete scenarios to be all historically observed returns, assumed equiprobable.

[9]We solve the model of a US investor, in currency hedged USD returns, using all countries in our full sample period, without constraints on political risk or short sales.

[10]For $\alpha > 0.62$, CVaR provides an upper bound for the variance of normal distributions, and when the distribution deviates from normality but α is much larger (like 0.95-0.99 used in typical applications), CVaR will again provide a bound, so, in general, a minimum CVaR portfolio has low variance. This is the intuition explaining Figure 2 (Panel C), but it is not a theoretical property of MtC minimization.

2.4 Statistical inference

To use MtC optimization as a diagnostic tool we develop an inference test to compare portfolios. We consider two instances of model (6), with solutions x_1^* and x_0^*, and optimal values MtC_1^* and MtC_0^*. These could be, for example, models diversifying internationally or the home market, or with constraints hedging political risks.

We test the null hypothesis H_0 against the alternative H_1,

$$\mathrm{H}_0 : \mathrm{MtC}_1^* - \mathrm{MtC}_0^* = 0 \quad \text{vs} \quad \mathrm{H}_1 : \mathrm{MtC}_1^* - \mathrm{MtC}_0^* > 0. \tag{10}$$

We propose the test statistic

$$T_S = \widehat{\mathrm{MtC}}_1 - \widehat{\mathrm{MtC}}_0, \tag{11}$$

where for $j \in \{0, 1\}$,

$$\widehat{\mathrm{MtC}}_j = \frac{\overline{r}_j}{\widehat{\mathrm{CVaR}}_j},$$

$$\overline{r}_j = \frac{1}{S}\sum_{t=1}^{S} r_{j,t}, \quad \widehat{\mathrm{CVaR}}_j = -\frac{1}{(1-\alpha)}\frac{1}{S}\sum_{t=1}^{S} r_{j,t} \cdot \mathbb{1}\big(r_{j,t} \leq \widehat{\zeta}_{j,1-\alpha}\big),$$

and $\widehat{\zeta}_{j,1-\alpha}$ denotes the empirical $(1-\alpha)$ quantile of the time series $r_{j,t}$, $t = 1, 2, \ldots, S$.

The limiting distribution of the test statistic T_S if the null hypothesis H_0 is true, is given by the following theorem. (Under the null, $\mathrm{MtC}_1^* = \mathrm{MtC}_0^*$ and we write MtC^* for simplicity. $\xrightarrow{d}$ denotes convergence in distribution.)

Theorem 2.2 (Limiting distribution of test statistic). *Suppose that Assumption 1 of Appendix A.3 is satisfied and that the null hypothesis in (10) is true. Then, as $S \to \infty$,*

$$\sqrt{S} \cdot T_S \xrightarrow{d} \mathcal{N}(0, \tau_0^2), \quad \tau_0^2 = \underline{c}^\top \Sigma_r \underline{c},$$

where

$$\underline{c} = \Big(\frac{1}{\mathrm{CVaR}_1}, -\frac{\mathrm{MtC}^*}{\mathrm{CVaR}_1}, -\frac{1}{\mathrm{CVaR}_0}, \frac{\mathrm{MtC}^*}{\mathrm{CVaR}_0}\Big)$$

and $\Sigma_r = \sum_{h=-\infty}^{\infty} \mathrm{Cov}(R_t, R_{t+h})$, where the vector R_t is defined as

$$R_t = \Big(r_{1,t}, -\frac{1}{(1-\alpha)}\; r_{1,t} \cdot \mathbb{1}(r_{1,t} \leq \zeta_{1,1-\alpha}),\; r_{0,t}, -\frac{1}{(1-\alpha)}\; r_{0,t} \cdot \mathbb{1}(r_{0,t} \leq \zeta_{0,1-\alpha})\Big)^\top.$$

Here, $\zeta_{j,1-\alpha}$, $j \in \{0,1\}$, denotes the $(1-\alpha)$ quantile of the distribution of $r_{j,t}$.

Proof. See Appendix A.3 □

Our test is consistent, with power approaching unity as the sample size tends to infinity. Based on this result and when the null hypothesis H_0 is wrong, it is rejected at any desired level $\beta \in (0,1)$ with probability tending to one, that is $P(\sqrt{S} \cdot T_S \geq z_{1-\beta}) \to 1$, where $z_{1-\beta}$ denotes the $(1-\beta)$ quantile of the $\mathcal{N}(0, \tau_0^2)$ distribution. Implementation of this test requires an estimation of τ_0^2, where the difficult part is the estimation of the covariance matrix Σ_r. In Appendix B we give a block bootstrapping algorithm following Paparoditis and Politis (2003) to estimate Σ_r and implement the inference test.

The algorithm can be simplified to test the pair of hypotheses

$$\mathrm{H}_0 : \mathrm{CVaR}_1 = \mathrm{CVaR}_0 \quad \text{vs} \quad \mathrm{H}_1 : \mathrm{CVaR}_1 > \mathrm{CVaR}_0, \tag{12}$$

using the test statistic

$$C_S = \widehat{\mathrm{CVaR}}_1 - \widehat{\mathrm{CVaR}}_0. \tag{13}$$

A corollary of Theorem 2.2 gives the limiting distribution of C_S under the null:

Corollary 2.1. *Under the null hypothesis in (12), as $S \to \infty$ we have $\sqrt{S} \cdot C_S \xrightarrow{d} \mathcal{N}(0, v_0^2)$ with $v_0^2 = \underline{e}^\top \Sigma_r \underline{e}$, where $\underline{e} = \big(0, 1, 0, -1\big)^\top$ and Σ_r is given in Theorem 2.2.*

The simplified test is given in Appendix B.

3 Empirical results

We put the model to the data to select international portfolios with political risk constraints. We first document a political risk exposure of internationally diversified portfolios, show the effects of hedging it, and add currency hedging. We show the effects of managing political risk when diversifying only in emerging markets, for long-horizon investors, and when short sales are allowed in developed markets. We use our inference test to compare the politically unconstrained MtC optimal international portfolios (U) and politically hedged (H), with the home index and the equally weighted portfolio.

3.1 Data

We consider first a US investor diversifying into 22 developed and 20 emerging stock market indices, using monthly USD returns including dividends, and spanning twenty-one years from January 1, 1999 to December 31, 2019. We use the MSCI investable indices, to avoid positive biases when ignoring frictions such as illiquidity and index replicability. The risk-free rate is the one-month US T-Bill rate.[11] For Eurozone investors we compute excess EUR returns over the one-month euribor from Refinitiv Eikon. For Japan, we convert the local USD returns into JPY using contemporaneous spot rates, and calculate

[11] We obtain this variable from Kenneth French's website, `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html#Developed`

excess returns over the 30-days deposit of domestic banks. Data are from Datastream. Our sample is quite comprehensive compared to earlier literature.[12]

The P-factor of Gala, Pagliardi, and Zenios (2020) is constructed as the monthly returns of equally weighted zero-cost tradeable portfolios, going long on countries with low ratings in portfolio sorts of political variables from the Ifo World Economic Survey (WES) (Becker and Wohlrabe, 2007), and short in countries with high ratings. The P-factor has economically and statistically significant average return of 7.93% p.a. (p-value 0.04), MtC 0.081, Sharpe ratio 0.45 p.a., and low correlations with several existing factors in the absolute value range 0.04–0.18. Its skewness of 2.09 and kurtosis of 16.51 (compared to -0.66 and 4.69, respectively, for the global market portfolio) highlight the fat-tails of political risk. The cross-country dispersion of WES political ratings is reflected in the dispersion of country loadings on the P-factor, which lines up well with their average excess returns ($R^2 = 0.41$, Appendix Figure D1).

For currency hedged returns we multiply country end-of-month index prices by the corresponding one-month forward exchange rate from Datastream. This hedges currency risk ex ante. The forward exchange rates to EUR and JPY are derived by absence of triangular arbitrage, from the spot and forward rates to the USD. We have complete time-series of such currency-hedged returns for 31 countries, excluding Brazil, Chile, China, Colombia, Egypt, Israel, Peru, Poland, Russia, South Korea, and Turkey. To complete the time-series for countries with missing forward rates, we follow Asness, Moskowitz, and Pedersen (2013) and use returns from futures contracts when available, otherwise we estimate synthetic replications of futures returns as the difference between local stock market returns and the local risk-free rate.

The Data Appendix provides descriptive statistics of excess returns. There are large differences of the moments across countries, with most indices being negatively skewed with considerable tail risk, especially in emerging markets, in line with Doeswijk, Lam, and Swinkels (2019); Ghysels, Plazzi, and Valkanov (2016). Jarque-Bera tests reject the normality assumption at conventional levels for all countries except Colombia, Japan, and South Africa. Comparing the average statistics of countries to the EW portfolio suggests potential diversification benefits for all investors, with greater gains for Eurozone and Japan. The US market has MtC ratio 0.05 which is very close to the EW portfolio 0.06, and it appears difficult to realize gains from international diversification.

[12]De Roon, Nijman, and Werker (2001) use 17 emerging markets over 11 years (1985–1996), with eleven markets introduced in the tests after the beginning of the sample period to exclude pre-liberalization regimes; Li, Sarkar, and Wang (2003) use 15 countries over 23 years (1976–1999); Ang and Bekaert (2002) use three economies (US, UK, Germany) over 25 years (1972–1997); Christoffersen, Errunza, Jacobs, and Langlois (2012) use 29 to 33 countries over 36 years (1973–2009); Driessen and Laeven (2007) use 52 countries over 17 years (1985–2002); Cosset and Suret (1995) use 36 countries over 8 years (1982 to 1991, excluding the market crash year 1987).

3.2 Political risk in international portfolios

We first construct internationally diversified politically unhedged optimal MtC portfolios, with NSS restrictions or with covered long-short (LS) positions in developed markets, using the linear programs from Appendix A.2. We report in Table 2 the political risk premia and the moments of portfolio returns, for US, Eurozone, and Japanese investors.

[Insert Table 2 Near Here]

The MtC NSS portfolios have economically large and statistically significant political beta and risk premia. Optimizing a tail-rik risk metric does not diversify away the political risk, and the political premia are even higher than those of the SR portfolios. This observation holds for the US, Eurozone, and Japan.

The MtC LS portfolios attain lower political risk than SR for US and Japan, by taking long-short positions in markets that hedge the political risk for each other. This MtC model behaviour can be explained by the high cross-sectional correlations of the moments with the political betas, ranging from 0.78 to 0.82 for all moments in all three currencies. This suggests that a model of tail risk that creates positive skewness and lower kurtosis, could naturally reduce political risk. The situation is more nuanced in the constrained NSS case when political hedging with short positions is disallowed. The MtC model reduces the third moment, but at an increase of second and fourth, and it is not clear a priori if political risk will be reduced. In this case the MtC portfolios have large political premia, and we need to project the feasible region onto the space of portfolios with bounded political beta of eqn. (9).

The SR portfolio return distribution is negatively skewed and leptokurtic, unlike the MtC portfolios that satisfy investor aversion to negative skewness. The MtC LS portfolios also deliver lower second and fourth central moments, and higher third moment than the SR portfolios, satisfying investor preferences for excess kurtosis (Dittmar, 2002).

To summarize, international diversification increases exposure to political risk. In the rest of the paper we show how to manage this risk, and find that investors still realize performance gains when political risk is hedged.

3.3 Managing political risk

We solve the MtC model with NSS (Appendix Theorem A.2) and constraint (9), to generate the β_P-MtC political frontier for US investors. Figure 3 shows significant tradeoffs between performance and political risk exposure, with P-factor loadings β_P reduced from the unconstrained 0.34 (Table 2) with MtC 0.106, to -0.15 with MtC 0.063.

[Insert Figure 3 Near Here]

On the figure we also plot frontiers obtained after screening assets to remove the worse-rated 20% or 40% by the ICRG ratings. Screening reduces portfolio political risk, but we achieve superior performance if we let the model select the portfolio without pre-screening. With unconstrained political beta, most of the weight is allocated to Russia which has the highest in-sample MtC but also very high political beta (0.77). Tightening the bound $\bar{\beta}$, reduces the allocation to Russia and increases allocation to Denmark with negative beta and one of the highest MtC among developed markets. The Russia-Denmark portfolio reduces political risk while preserving performance gains, whereas screening would remove Russia with its high MtC. The sub-optimality of screening is consistent with what Pedersen, Fitzgibbons, and Pomorski (2021) find for ESG portfolios.

3.3.1 Hedging political risk

We now turn to the main question of what happens to international portfolios with zero political beta. Our baseline test is in the home currency with NSS. We compare, firstly, the politically unconstrained (U) with the hedged (H) portfolios, and, secondly, with the index and the EW diversified portfolio. Comparing the politically unconstrained with the hedged portfolio we address the main question, comparing with the index we establish the diversification benefits, and comparing with EW we assess the MtC model. In Table 3 we report the results for US, Eurozone, and Japan. For each portfolio we report the political beta, average excess return, CVaR, and MtC. (We also report Sharpe ratios to show that gains in MtC do not worsen Sharpe.)

[Insert Table 3 Near Here]

The political beta of the US index is indistinguishable from zero. EW diversification increases political risk with beta 0.12, with a further increase to 0.34 for the unconstrained MtC optimal portfolio (p-values 0.00). The political risk premia, computed as the political beta times the P-factor mean, are a significant 0.93% for EW and 2.70% for the MtC portfolio. Does the politically hedged portfolio preserve diversification benefits? Column "U-H" shows a decrease in monthly average excess returns with a reduction of risk, and the changes in performance (MtC and Sharpe) are indistinguishable from zero. Hedging political risk does not erode the diversification benefits. We compare unconstrained and hedged portfolios with the index to ascertain the diversification benefits. Column "U-I" shows performance gains when diversifying internationally, with MtC increasing by 0.053 and Sharpe ratio by 0.09, significant at conventional levels. The improvements in performance persist when hedging political risk (column "H-I"), albeit with smaller values than the unconstrained case. Comparing the MtC portfolios with EW (columns

"U-EW" and "H-EW") we note consistent performance gains. Overall, the gains are smaller for the politically hedged portfolios, but remain strongly statistically significant and economically large, with MtC increasing by 0.032 from 0.059 (EW) and by 0.038 from 0.053 (I), and Sharpe increasing by 0.06 from 0.13 for EW and 0.12 for I.

The results for Eurozone and Japan are even stronger, since the US is the most challenging test case, given its low political risk, high average returns, and low tail risk.

For Eurozone investors, EW diversification increases political risk beta to 0.16, doubling to 0.31 for the unconstrained MtC portfolio. The political risk premia are 1.27% for EW and 2.47% for the MtC portfolio. Comparing U and H portfolios we observe no significant change in performance, with large gains over the index. Column "U-I" shows diversification gains, with MtC increasing by strongly significant 0.089 and Sharpe by 0.16. Column "H-I" shows persistent gains when hedging political risk, with MtC and Sharpe increasing by 0.060 and 0.14, respectively. We also note consistent gains over the EW portfolio in columns "U-EW" and "H-EW". Overall, politically hedged portfolios register significant gains, with MtC increasing by 0.026 from 0.063 of EW and by 0.060 from 0.030 of I, and Sharpe increasing by 0.07 from 0.15 (EW) and by 0.14 from 0.07 (I).

For Japanese investors, EW diversification increases political risk with beta 0.14, which triples to 0.42 for the optimal unconstrained portfolio. The political risk premia are 1.13% for EW and 3.36% for the MtC portfolio. Column "U-I" shows strongly significant gains, with MtC increasing by 0.065 and Sharpe by 0.12, and column "H-I" shows that gains persist when hedging political risk, with slightly smaller MtC and Sharpe gains of 0.045 and 0.11, respectively, and consistent gains over EW. Politically hedged portfolios register statistically significant and economically large gains with MtC increasing by 0.024 from 0.065 (EW) and by 0.045 from 0.044 (I), and Sharpe increasing by 0.06 from 0.15 (EW) and by 0.11 from 0.09 (I).

In conclusion, international diversification increases the exposure to political risk, but with significant performance gains for all three investors. Hedging political risk erodes but does not eliminate the gains. The gains over the home index support international diversification even when political risk is hedged, whereas gains over the EW portfolios highlight the efficacy of MtC portfolio selection. The evidence from Eurozone and Japan also strengthens the findings of Driessen and Laeven (2007) about the diversification benefits for non-US investors, when accounting also for political risk.

Portfolio weights show diversified and balanced portfolios with 4–5 assets, and significant exposure to emerging markets. The changes in portfolio composition when hedging political risk sheds some light on the home equity bias puzzle. The aggregate exposure to developed markets increases from 23% (U) to 55% (H) for the US, from 20% to 68% for Eurozone, and from 14% to 59% for Japan. Hedging political risk tilts international portfolios away from politically risky countries, but the tilt is away from emerging into developed countries, and not, necessarily, towards the home. These findings support empirically that country characteristics related to political risk tilt internationally diversified portfolios in the direction anticipated by Guidolin and Timmermann (2008). Naturally, hedging political risk for an emerging market investor will tilt the portfolio away from the home towards less risky developed countries, and even for the developed economies we consider here, the observed tilt is not fully aligned with what is observed in practice.[13] Political risk aversion can not explain the puzzle.

3.3.2 Hedging currency risk

We rule out that currency risk management subsumes the management of political risk by augmenting the baseline test with currency hedging. We use unitary hedging whereby all investments are in currency hedged index returns, and consider optimal hedge ratios (Black, 1989) in subsection 4.2 . The results are reported in Table 4 and are in agreement with the home currency results of Table 3. Currency hedged international diversification increases portfolio political beta and carries economically significant political premia compared to the market. For USD hedged investors, EW diversification increases political risk with beta 0.13, or 0.11 for the politically unconstrained MtC portfolio. The political risk premia are 1.03% for EW and 0.87% for MtC portfolios. These values are lower compared to the currency unhedged portfolios, but remain strongly statistically significant (p-values 0.00) and relatively large, so that currency hedging reduces but does not eliminate political risk. This finding is in line with Gala, Pagliardi, and Zenios (2020) who find that the P-factor proxies for a slope factor in international stock returns, distinct from the carry factor in currency portfolios of Lustig, Roussanov, and Verdelhan (2011).

[Insert Table 4 Near Here]

For US investors, hedging both political and currency risk does not erode the benefits of diversification, and we note (column "H-I") economically and statistically significant gains over the index, with MtC increasing by 0.041 from 0.053, and Sharpe by 0.10 from 0.12. Comparing the MtC optimal portfolios with EW (column "H-EW") we note MtC increases by 0.038 from 0.056, and Sharpe increases by 0.08 from 0.13.

Likewise, Eurozone investors achieve economically and statistically significant gains over the index when diversifying internationally (column "U-I"), with MtC increasing by 0.076 and Sharpe ratio by 0.13. The improvements persist when also hedging political

[13]Data on foreign equity investments from the IMF International Financial Statistics, and the World Bank world market capitalization, show holdings of US investors in the home market of 81%, for Eurozone 30%, and for Japan 84%, which are much higher than each country's share of the world market capitalization of 50%, 10%, and 8%.

risk, with MtC and Sharpe improving by 0.063 and 0.13, respectively. We also note consistent gains with respect to EW, with politically hedged MtC increasing by 0.042 from 0.051, and Sharpe increasing by 0.09 from 0.12. Japanese investors achieve significant improvements of both U and H optimal portfolios over the EW. The hedged portfolio improves MtC by 0.038 from 0.052 and Sharpe by 0.08 from 0.12.

In conclusion, the increased exposure of international portfolios to political risk persists even when currency risk is hedged. The significant performance gains from international diversification, that are well documented in the literature (see footnote 1), survive both currency and political risk hedging. This is a new result in the literature.

3.4 Emerging markets

Political risk is especially high in emerging markets (Bekaert and Harvey, 2003; Diamonte, Liew, and Stevens, 1996), and zero political beta portfolios may not be feasible when diversifying only in these markets. The political efficient frontier for emerging markets lies below the one in Figure 3, and does not extend to the point $\beta_P = 0$. In Table 5 we report results for four points on the political frontier of the home country and emerging markets. We observe that it is possible to reduce significantly political risk and still realize performance gains, in line with the baseline Table 3.[14]

[Insert Table 5 Near Here]

For US investors, a reduction of political beta from the unconstrained 0.45 to 0.20 preserves significant diversification benefits, with MtC higher by 0.047 from the index and 0.024 from EW. The results are stronger for Eurozone, where a reduction of political beta from 0.49 to 0.20, improves MtC by 0.079 compared to the index and 0.028 compared to EW. For Japan, a reduction of political beta from 0.45 to 0.20 improves MtC by 0.054 and 0.018 compared to the index and EW, respectively.

It is possible to reduce the portfolio beta further, but the benefits from diversification erode as the portfolio shifts towards the home country. There are no statistically significant gains for $\beta_P = 0.10$, and for $\beta_P = 0.05$ the home allocations increase to 52%, 18%, and 89% for the three investors, respectively, corroborating Dahlquist et al. (2003) that political risk aversion is a factor for the home equity bias.

[14] We do not report Sharpe ratios, as they are less meaningful for the highly skewed emerging markets. Results are available from the authors, and they are consistent with the MtC results.

3.5 Long-horizon investors

Investors who view international diversification as a means to reduce risk instead of enhancing performance consider the portfolio risk over long horizons.[15] Viceira and Wang (2018) show that international investors reduce significantly long-term portfolio risk when the cross-country return correlation is due to correlated discount news than cashflow news. However, political variables affect returns through both cashflow and discount rate channels (Gala et al., 2020), raising an empirical question whether political hedging may not reduce long-term risk if the cashflow channel dominates. We document that, on the contrary, political hedging reduces portfolio tail risk for long-term investors.

We follow Asness, Israelov, and Liew (2011) and estimate CVaR and worst case losses of the index of unconstrained and hedged portfolios, over one month to ten years; see Figure 4. Portfolios held for 24 months or longer have consistently smaller CVaR and worst-case losses than the index, in line with Asness et al.[16] The politically hedged portfolios registers smaller CVaR and worst-case losses than the unconstrained portfolio, and outperform the index earlier than the unconstrained portfolio. Hedging political risk reduces portfolio tail risk for long-horizon investors. Similar results are observed for all investors, with Eurozone investors noticing gains earlier (12 months) than US and Japanese investors (20 months).

[Insert Figure 4 Near Here]

We take the analysis a step further to report also the MtC in Table 6. Our main finding from Table 3 carries over to long horizons. Hedging political risk pays even more in the long run, and gains from international diversification increase with longer horizons for all three investors.

[Insert Table 6 Near Here]

3.6 Short positions

To consider short positions we first address the debate between De Roon et al. (2001) and Li et al. (2003) on the diversification gains from short sales in emerging market. We calculate the optimal MtC of an international LS portfolio consisting of developed markets and compare it with the MtC of an international portfolio of developed and emerging markets when short-sales are allowed only in developed markets. Applying our inference test we find that the MtC differences are insignificant for all three investors. Therefore, we

[15] Asness, Israelov, and Liew (2011); Christoffersen, Errunza, Jacobs, and Langlois (2012); Cosset and Suret (1995), among others.

[16] We use an inference test based of Corollary 2.1, to test the statistical significance of the differences observed in the figure. Our conclusion is supported by this test, see Appendix Tables C1 and C2.

confirm De Roon et al. that short sales in emerging markets do not bring diversification benefits. Therefore, and following also Ang and Bekaert (2002); Driessen and Laeven (2007), we introduce short positions in developed but not in emerging markets, using the model from Appendix Theorem A.3 with constraint (9). The results are in Table 7.[17]

[Insert Table 7 Near Here]

We observe that the MtC portfolio political beta is not statistically significant for the US and Japan, and for Eurozone, the political beta 0.15 (p-value 0.04) is half the beta 0.31 of long-only portfolios (Table 3). Optimal MtC portfolios have long-short positions that naturally hedge political risk, suggesting that optimizing the tail risk of portfolios with short positions may diversify political risk. This is a byproduct of MtC optimization and it is not achieved with SR portfolios, as demonstrated in section 3.2. The asset allocations of the unconstrained portfolio for the US goes long in developed countries with negative political beta (Denmark, Switzerland) and short in positive betas (Finland, Greece), and the portfolio beta is not statistically significant. In contrast, the SR portfolio (Table 2) has political beta 0.12 (p-value 0.04). The MtC portfolio of the Japanese investor has a non-significant beta, whereas the SR portfolio has beta of 0.15 (p-value 0.04).

Consistent with our main finding, the benefits from international diversification persist with political hedging, both with respect to the index and the EW portfolio. MtC improvements are in the range 0.122 to 0.207 and Sharpe improvements in the range 0.16 to 0.27, all strongly statistically significant. Comparing with the hedged portfolios of Table 3 we observe, as expected, larger gains than with no short sales.

4 Robustness tests

We carry additional tests to confirm the robustness of our results to expected return estimates and to the currency hedging strategy. We also test out-of-sample and the sensitivity to transaction costs. Finally, we test the robustness of the findings with short positions to currency hedging and for long-horizons.

4.1 Returns implied from a model pricing political risk

All tests were performed using expected returns imputed as the average of historical returns over the sample period. Goetzmann and Jorion (1999) point out that emerging

[17] Country weights, not reported, show portfolios that are well balanced and diversified in both unconstrained and hedged cases, with about nine assets in the long and six in the short legs, with holdings in both developed and emerging markets.

markets have high returns during their emergence phase, that drastically diminish afterwards. To mitigate potential concerns about bias due to estimation error we replace past average returns with the expected returns implied by the model of Gala et al. (2020).

We obtain model-implied returns by first estimating factor loadings from time-series regressions of country excess returns on the MSCI world market portfolio and the P-factor over the whole sample. We then obtain scenarios of returns by multiplying the country factor loadings by the corresponding factor at each time period of the sample, plus independent Gaussian noise with zero mean and the standard deviation of the country index. We solve the MtC model with inputs the time-series of returns implied by the asset pricing model, repeat the test 5,000 times to rule out serendipitous results, and report average statistics in Table 8.

[Insert Table 8 Near Here]

Consistent with the main finding, the diversified portfolios have significant exposure to political risk, but hedging it still preserves significant performance gains for all three investors, over both I and EW portfolios. For politically hedged US investors, the average MtC increases by 0.048 compared to 0.053 of the Index. Comparing with EW we note average MtC gains by 0.053 from 0.048. Average Sharpe increase by 0.09 from 0.11 over I and by 0.09 from 0.11 over EW (p-values 0.0). The corresponding average gains for Eurozone investors are 0.066 for MtC and 0.11 for Sharpe, over the index, and by 0.043 and 0.07, respectively, over EW. For Japanese investors, MtC increases by 0.057 and Sharpe by 0.10 over the index, and 0.052 and 0.08, respectively, over EW. All results are statistically significant to two decimal points.

The gains are higher and with stronger statistical significance than those obtained with historical returns in Table 3. Since countries that are more exposed to political risk have higher average returns (Appendix Figure D1), the model-implied frontier achieves somewhat higher peak value than a frontier obtained by projecting historical averages. This finding is in line with (Pedersen et al., 2021, Fig. 1, Panel A) who find a (slight) upward shift of the tangency portfolio when using ESG pricing information.

4.2 Selective hedging

We consider hedge ratios (Black, 1989) different than unitary, that hedges all currency risk a priori. Following Topaloglou, Vladimirou, and Zenios (2002) we write the portfolio vector as the sum of its currency hedged and unhedged positions, $x = x_{ch} + x_{cu}$, with portfolio return $\tilde{r}_p = \tilde{r}_{ch}^\top x_{ch} + \tilde{r}_{cu}^\top x_{cu}$. The MtC model is applied to a sample consisting of the indices of unhedged returns $\tilde{r}_{cu}$ and hedged returns $\tilde{r}_{ch}$, including by definition the home index, to optimize currency hedging.[18] Table 9 shows that our main finding is robust to the currency hedging method. The unconstrained portfolio has economically large and statistically significant political betas for all three investors, and hedging political risk consistently preserves MtC and Sharpe gains over the home index and the EW portfolio.

[Insert Table 9 Near Here]

Comparing with Table 4 we observe somewhat better performance of portfolios with selective than unitary hedging, both in MtC and Sharpe ratios. This is expected since selective hedging is more general. However, the political beta of portfolios U is significantly increased by 0.03 (US), 0.23 (Eurozone), and 0.16 (Japan). This reiterates our main message on the importance of political risk in international portfolios. Selective hedging allows investors to better hedge currency risk, but with increased exposure to political risk. The proportion of currency hedged portfolio is not monotonic with political risk. For the US investor it is reduced from 0.73 to 0.63 with political hedging, for the Eurozone it decreases from 0.34 to 0.21, but for Japan it increases from 0.43 to 0.63. The non-monotonic change corroborates that currency and political risk are distinct.

4.3 Out of sample test

We use the 48-month period 1999-2002 as a window at $t = 0$ to calibrate the political betas and obtain scenarios of returns, run the MtC model to obtain a portfolio, and evaluate the ex post portfolio performance for the subsequent month. We then roll the calibration window forward by one period, $t+1$, re-estimate the betas, re-run the model, and evaluate again the performance. We repeat the process 204 times until end of 2019, and collect summary statistics of the ex post portfolio returns.

We run the test with selective currency risk hedging, and one-way transaction cost of 0.2%. For fair comparison with the index, we assume a transaction cost of 0.2% per annum for investing in an index-tracking ETF.[19] The results are reported in Table 10. For the exposure to political risk we report the average absolute value of the β_P for each strategy over the 204 repetitions. The results corroborate our in-sample main finding of large political risk in international portfolios, and the persistence of diversification gains when hedging political risk.

[Insert Table 10 Near Here]

[18]For US and Japanese investors there are 42 hedged and 41 unhedged returns. For Eurozone investor there are 31 unhedged returns, since country returns in euro are by default currency hedged.

[19]We follow Cosset and Suret (1995) and remove the great financial crisis year 2008 in estimating the statistical significance of performance ratios. The MtC and Sharpe ratios reported include the crisis year, but the 2008 data are an outlier producing a large estimation error so that the performance gains over the index are not statistically significant for the US and Japan, but the gains over EW remain significant even when 2008 is included.

The magnitude and statistical significance of the out-of-sample MtC gains of the hedged portfolio over the index are similar to the in-sample (cf. Table 9) for the Eurozone and Japan. For US investors the out-of-sample test realizes gains of 0.016 with p-value 0.15. The MtC optimal portfolios realize economically and statistically significant gains out-of-sample over EW of, respectively, 0.062, 0.078, and 0.053 for the three investors (p-values 0.00–0.03).

The average turnover of the 204 portfolios is 21%, 19%, and 14% for the three investors. The transaction costs due to large turnover for the US investors can explain the weak statistical significance of the gains of the hedged portfolio over the index, recalling also that the US market has large MtC ratio and low political risk..

4.4 Transaction costs

We introduce proportional transaction costs (Zenios, 2007, ch. 3), contributing this important feature to earlier works (Ang and Bekaert, 2002; Christoffersen et al., 2012), to assess whether the diversification benefits with hedged political risk disappear due to these costs. Table 11 reports results with the baseline model with transaction costs. Portfolio H registers economically and statistically significant MtC gains over both the index and the EW portfolio for all investors, with transaction costs as high as 0.2% in developed or 0.5% for emerging markets. Higher trading costs imply smaller gains vis-à-vis the index. Comparing the no-transaction cost portfolio U with the those with trading fees, we notice reduction of MtC gains over I from 0.038 to 0.030 for US, from 0.060 to 0.050 for Eurozone, and from 0.045 to 0.042 for Japan, but they all remain statistically significant at conventional levels. Comparable reductions are observed in the gains over the EW portfolio, and our main result holds for a large range of transaction costs.

[Insert Table 11 Near Here]

Interestingly, adding transaction costs tilts the portfolio towards politically risky countries, due to their higher expected returns. The political premium of the NSS unconstrained portfolio with transaction costs 0.5% as in De Roon, Nijman, and Werker (2001), is 4.91% for US, 4.35% for Eurozone, and 4.45% for Japan. These values are larger than the premia without transaction costs —2.25%, 1.39% and 2.36%, respectively— and much greater than the political premia of the home indices — -0.08%, 0.30% and 0.32%. This reaffirms our main message on the significance of political risk in international portfolios.

4.5 Further tests with short positions

We test LS portfolios with currency hedged returns (Appendix Table C3). The politically unconstrained MtC portfolio diversifies away political risk for all investors and registers consistent gains over both the index and the EW portfolio, in line with Table 7. For US investors, MtC increases over I by 0.136 from 0.053, and Sharpe by 0.19 from 0.12. For Eurozone, MtC increases by 0.149 from 0.030, and Sharpe by 0.23 from 0.07, and for Japan the respective increases are 0.138 from 0.044 and 0.21 from 0.09. Almost identical gains are realized over EW. We also test for long-horizon investors (Appendix Table C4). MtC gains of both unconstrained and hedged portfolios over I increase for longer horizons, in line with Table 6. The returns of H and U portfolios are indistinguishable until about month 40, and past that the hedged portfolio outperforms the unconstrained.

5 Conclusions

While international diversification improves portfolio performance compared to the home index and an equally-weighted diversification strategy, it also increases exposure to political risk. International portfolios carry a significant political risk premium.

We make a methodological contribution to account for the skewed return distributions that characterize the international equities markets, especially for emerging markets and high political risk, and develop an MtC portfolio selection model. MtC optimal portfolios satisfy second order stochastic dominance, so that we can derive political efficient frontiers to manage political risk for investors with increasing concave utility functions. We also develop an inference test to compare MtC optimal portfolios and draw conclusions.

Our main empirical finding is that hedging political risk erodes but does not eliminate diversification benefits over the home index or equally-weighted diversified portfolios. Like existing literature that finds that currency hedging does not eliminate diversification benefits, we show that it is possible to also hedge another major source of risk (political) while preserving significant gains. Hedging political risk pays even more in the long run with international diversification gains increasing with longer horizons. Hedging is also beneficial for risk reduction in the long-run and not only for performance enhancement.

Political hedging tilts international portfolios away from politically risky countries, but the tilt is away from emerging into developed countries, and not, necessarily, towards the home. These findings support empirically results that were anticipated by earlier literature. However, the tilt is not fully aligned with what is observed in practice, and political risk aversion can not explain the puzzle.

We perform successfully an extensive set of tests to safeguard against concerns that our findings are due to estimation errors, or that they can be subsumed by currency hedging, or erode due to transaction costs. Our results survive these robustness tests.

The MtC model is tractable and comes with a consistent inference test, so that it is applicable to portfolio selection problems where skewness is a first-order concern.

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Data Appendix

Descriptive statistics

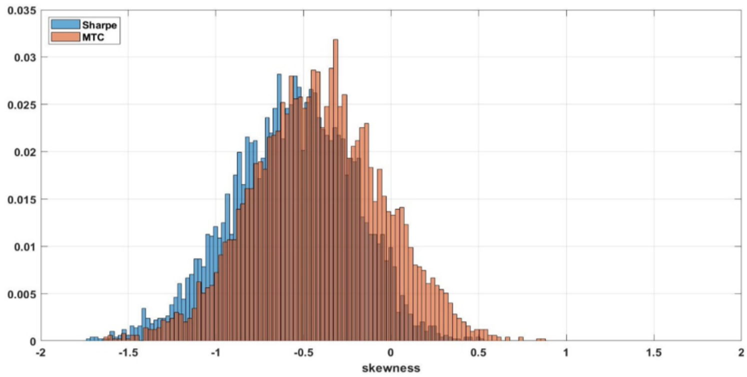
This table reports descriptive statistics for all countries in our sample, respectively, mean, standard deviation, skeweness, excess kurtosis, Value-at-Risk and Conditional-Value-at-Risk for the monthly series of each country's excess returns, denominated in USD, over the US one-month T-Bill rate. "MtC" and "Sharpe" denote the monthly mean-to-CVaR for each country's excess returns, and the Sharpe ratio. VaR, CVaR, and MtC are computed at the 5% confidence level. "Policy" and "Politics" are the WES policy and politics ratings, averaged over time. "ICRG" is the average over time of the aggregate rating from the International Country Risk Guide. The sample period spans January 1, 1999 to December 31, 2019. All statistics are reported at monthly frequency, except for the politics and policy variables that are semiannual. Mean, StdDev, VaR, and CVaR are in percentage points.

Country	Mean	StdDev	Skew	Kurt	VaR	CVaR	MtC	Sharpe	Policy	Politics	ICRG
Australia	0.77	5.98	-0.54	1.99	8.35	13.77	0.06	0.13	54.64	7.05	85.62
Austria	0.60	6.81	-0.87	4.32	9.45	15.91	0.04	0.09	50.77	7.74	85.43
Belgium	0.35	6.00	-1.22	5.60	9.46	15.09	0.02	0.06	46.14	5.71	81.28
Brazil	1.38	10.55	-0.04	1.16	14.06	21.93	0.06	0.13	34.45	4.79	65.50
Canada	0.71	5.61	-0.53	2.62	8.39	12.09	0.06	0.13	70.35	7.21	86.61
Chile	0.67	6.26	-0.23	1.34	9.15	13.24	0.05	0.11	55.54	6.96	76.39
China	0.85	8.21		3.98	13.07	17.24	0.05	0.10	62.81	5.80	63.28
Colombia	1.15	8.20	-0.16	0.26	12.88	16.34	0.07	0.14	50.98	4.64	57.44
Czech Republic	1.02	7.43	-0.09	1.24	10.59	15.39	0.07	0.14	26.84	5.08	77.84
Denmark	0.87	5.70	-0.73	2.69	9.38	13.63	0.06	0.15	74.86	7.81	84.17
Egypt	0.79	8.93	0.07	2.14	13.41	18.50	0.04	0.09	15.18	4.21	58.12
Finland	0.60	8.11	0.10	2.07	13.42	18.13	0.03	0.07	65.27	8.04	90.82
France	0.49	5.80	-0.46	0.99	10.58	13.62	0.04	0.08	31.51	6.80	75.83
Germany	0.46	6.50	-0.37	1.64	10.25	15.48	0.03	0.07	37.59	7.47	84.50
Greece	-0.37	10.55	-0.23	0.68	18.01	24.24	-0.02	-0.03	26.63	6.05	73.47
Hong-Kong	0.70	6.04	-0.17	1.46	9.77	13.12	0.05	0.12	23.82	6.01	78.42
Hungary	0.88	9.16	-0.51	2.19	14.60	21.38	0.04	0.10	14.63	5.53	77.76
India	1.12	8.28	-0.02	2.04	13.22	17.38	0.06	0.13	34.45	5.22	60.23
Ireland	0.32	6.49	-0.70	1.94	11.78	16.44	0.02	0.05	60.28	7.40	85.97
Israel	0.62	6.26	-0.23	1.38	10.55	14.06	0.04	0.10	29.14	4.05	64.40
Italy	0.24	6.61	-0.22	0.58	11.20	14.70	0.02	0.04	16.29	4.03	76.80
Japan	0.32	4.77	-0.12	0.33	7.98	9.91	0.03	0.07	23.64	5.95	81.93
Malaysia	0.75	5.78	0.63	4.58	9.01	11.37	0.07	0.13	30.63	4.74	72.11
Mexico	0.80	6.67	-0.50	1.58	10.62	14.55	0.05	0.12	20.34	4.78	68.29
Netherlands	0.46	5.76	-0.71	1.94	9.65	14.05	0.03	0.08	62.65	7.20	86.77
New Zealand	0.93	5.74	-0.44	0.79	8.72	12.55	0.07	0.16	47.54	6.77	87.85
Norway	0.86	7.28	-0.65	2.79	9.39	16.38	0.05	0.12	77.19	7.60	88.14
Peru	1.19	7.64	-0.28	2.14	11.51	15.72	0.08	0.16	39.74	3.58	63.30
Philippines	0.57	6.95	-0.02	0.97	11.08	14.56	0.04	0.08	29.42	4.38	63.25
Poland	0.74	9.11	-0.10	0.79	13.16	18.98	0.04	0.08	27.28	5.17	77.32
Portugal	0.09	6.30	-0.33	0.82	10.03	13.97	0.01	0.01	32.74	6.52	81.20
Russia	1.91	10.59	0.55	3.44	15.09	20.26	0.09	0.18	18.99	4.99	60.55
South Africa	0.91	7.14	-0.31	0.10	10.62	14.36	0.06	0.13	28.50	4.65	66.35
South Korea	0.95	8.50	0.20	0.92	13.94	16.61	0.06	0.11	24.01	5.15	76.87
Spain	0.40	6.70	-0.14	1.04	10.08	14.31	0.03	0.06	41.09	5.50	75.74
Sweden	0.78	6.98	-0.15	1.93	11.70	16.00	0.05	0.11	62.39	7.11	88.15
Switzerland	0.51	4.43	-0.46	0.62	7.37	10.35	0.05	0.12	73.45	7.94	88.34
Taiwan	0.53	7.24	0.09	1.10	11.10	15.07	0.03	0.07	9.37	4.47	78.05
Thailand	1.07	8.47	-0.01	2.92	11.46	18.95	0.06	0.13	23.38	3.87	61.31
Turkey	1.18	13.51	0.53	3.12	17.10	27.07	0.04	0.09	28.17	4.20	57.75
UK	0.33	4.67	-0.38	1.45	7.22	10.17	0.03	0.07	45.54	6.33	82.89
US	0.52	4.33	-0.64	1.02	7.85	9.84	0.05	0.12	33.97	6.63	82.82
EW portfolio	0.71	5.37	-0.65	5.68	8.38	12.04	0.06	0.46	39.68	5.87	75.69

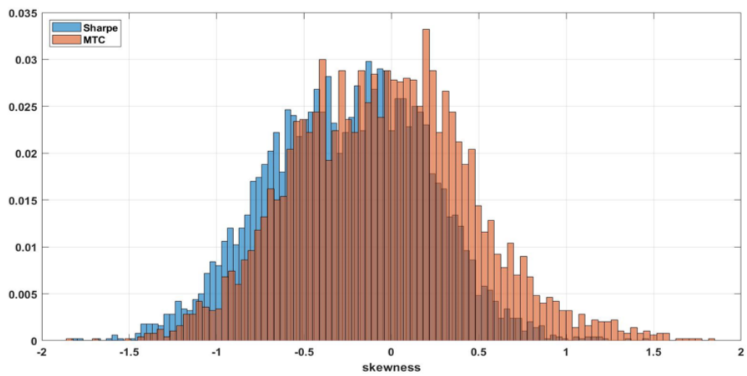
Figure 2 – Empirics of Mean-to-CVaR portfolios

This figure illustrates empirically the relative benefits of mean-CVaR (MC) compared to mean-variance (MV) optimization. Panels A and B show the distribution of the skewness of optimal mean-to-CVaR (MtC) and Sharpe ratio (SR) portfolios from 5000 block bootstrapped samples of asset returns, for developed and emerging markets, respectively. Panel C shows the standardized error of the portfolio risk measure not optimized by each model from its optimal value for an identical test problem over the sample of 22 developed economies and 20 emerging markets, spanning 1999–2019.

(a) Skewness of MtC and SR portfolios for developed markets



(b) Skewness of MtC and SR portfolios for emerging markets



(c) Standardized errors of risk with MC and MV models

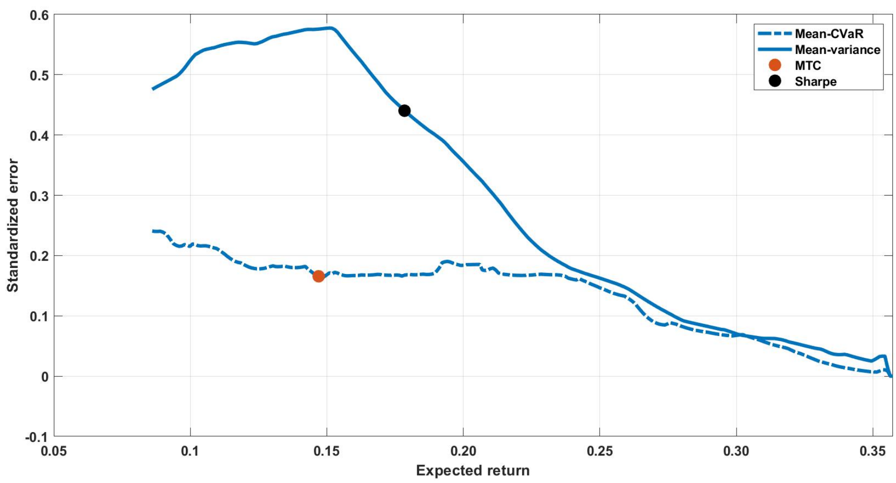


Figure 3 – The β_P-MtC political frontier of international portfolios

This figure illustrates the tradeoff between MtC and political risk in internationally diversified portfolios, where portfolio political risk is measured by the political beta. It also shows the frontiers obtained after screening the set of assets to remove the worse-rated 20% (resp. 40%) by the ICRG ratings. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019.

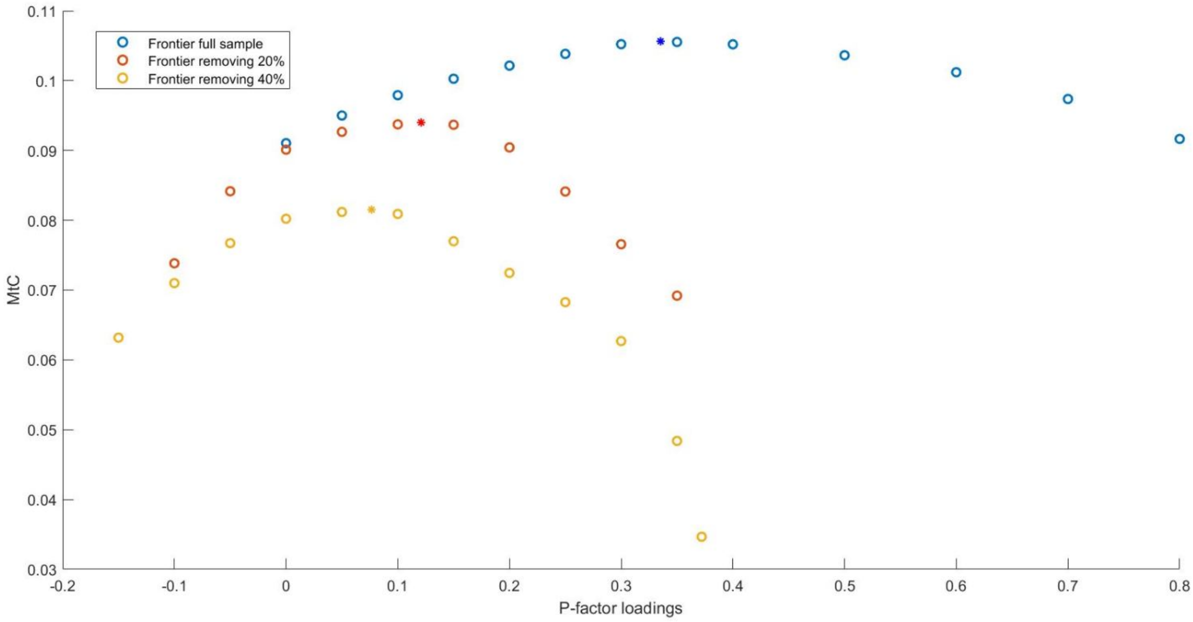
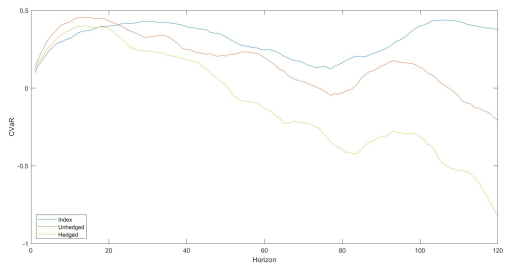


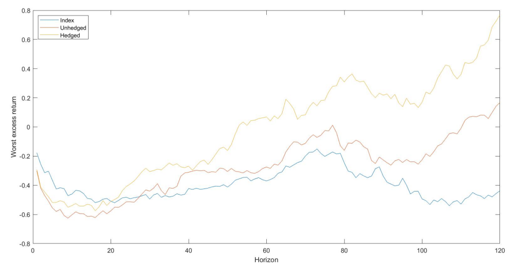
Figure 4 – Portfolio losses for long-horizon investors

This figure displays the CVaR and worst case losses of international portfolio investors, with holding periods ranging from one month to ten years, for the US (Panels A-B), Eurozone (Panels C-D), and Japan (Panels E-F). Each panel reports results with the country index, and the mean-to-CVaR unconstrained and politically hedged portfolios. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019.

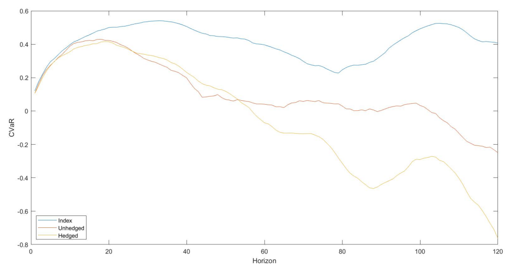
(a) US -CVaR losses



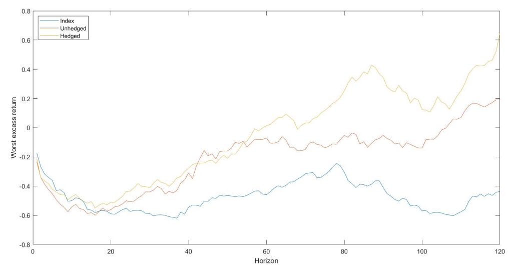
(b) US -Worst case losses



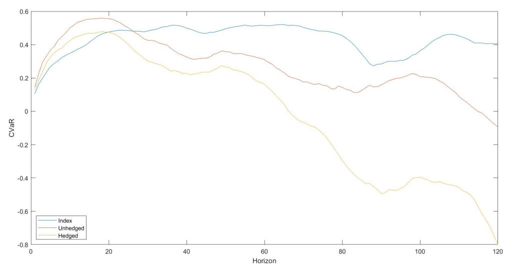
(c) Eurozone -CVaR losses



(d) Eurozone -Worst case losses



(e) Japan -CVaR losses



(f) Japan -Worst case losses

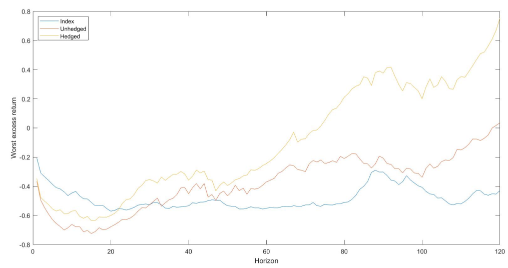


Table 1 – Performance and political risk of international portfolios

This table reports performance statistics of the MSCI home market index I and internationally diversified portfolios in the home currency using equally weighted portfolios EW and the maximum Sharpe portfolio SR. We also report the exposure of each portfolio to a global political risk factor β_P with the associated political risk premium, and the differences in political risk premium and Sharpe ratio of I and the EW portfolios from the SR portfolios. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	(a) US			(b) Eurozone			(c) Japan		
	I	EW	SR	I	EW	SR	I	EW	SR
Sharpe	0.42	0.46	0.74	0.25	0.52	0.86	0.32	0.51	0.77
ICRG rating	82.81	75.68	71.48	81.60	75.68	74.98	81.94	75.68	70.27
β_P	-0.01	0.12*	0.23*	0.04	0.16*	0.17*	0.04	0.14*	0.26*
	(0.57)	(0.00)	(0.00)	(0.22)	(0.00)	(0.00)	(0.41)	(0.00)	(0.00)
Political premium	-0.08	0.93	1.84	0.31	1.30	1.34	0.32	1.13	2.05
Market premium	4.96	5.91	5.53	4.99	4.35	3.77	3.93	5.97	5.65
Diff. to SR Sharpe	0.32*	0.28*	–	0.60*	0.34*	–	0.45*	0.26*	–
	(0.06)	(0.00)	–	(0.00)	(0.00)	–	(0.02)	(0.01)	–
Diff. to SR β_P	0.24*	0.11*	–	0.13*	0.00	–	0.22*	0.12*	–
	(0.00)	(0.01)	–	(0.01)	(0.92)	–	(0.00)	(0.07)	–

Table 2 – Political risk of maximum Sharpe and mean-to-CVaR portfolios

This table reports the exposure of internationally diversified portfolios to a global political risk factor β_P, and the political premium computed as the product of β_P and the expected return of the P-factor, as well as the moments and CVaR of portfolio returns. Portfolios are constructed with mean-to-CVaR (MtC) and Sharpe (SR) optimization. We consider no-short-sales (NSS), and long-short strategies (LS) in developed markets. We denote by $\mu_n \doteq \mathbb{E}\left[(r - \mathbb{E}[r])^n\right]$ the n^{th} central moment of the portfolio returns. The second (third and fourth) central moments have been rescaled by multiplying the original values by 10^3 (10^5). The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	(a) US				(b) Eurozone				(c) Japan			
	NSS		LS		NSS		LS		NSS		LS	
	SR	MtC	SR	MtC	SR	MtC	SR	MtC	SR	MtC	SR	MtC
β_P	0.23*	0.34*	0.12*	0.09	0.17*	0.31*	0.15*	0.15*	0.26*	0.42*	0.15*	0.08
	(0.00)	(0.00)	(0.04)	(0.13)	(0.00)	(0.00)	(0.01)	(0.02)	(0.00)	(0.00)	(0.04)	(0.29)
Political premium	1.84	2.66	0.97	0.68	1.34	2.50	1.18	1.18	2.05	3.36	1.16	0.66
μ	14.80	16.30	19.77	15.40	13.20	15.25	20.03	18.64	17.05	19.09	23.20	20.27
μ_2	3.35	4.20	2.49	1.83	1.97	2.88	1.93	2.06	4.05	5.38	3.22	3.17
μ_3	-10.44	-8.27	-3.34	1.68	-6.10	-3.35	-1.12	4.39	-21.29	-15.98	-9.94	7.85
μ_4	6.63	9.09	2.27	1.26	2.11	4.09	1.19	1.56	11.44	17.62	5.22	5.01
CVaR	12.09	12.86	9.42	6.82	10.00	10.69	8.07	6.19	13.81	14.56	11.47	8.82

Table 3 – Hedging political risk of international portfolios

This table reports performance statistics of the MSCI home market index I and internationally diversified portfolios for investors in the US, Eurozone, and Japan, using equally weighted portfolios EW and mean-to-CVaR unrestricted optimal portfolios (U) and with political risk hedging (H). Returns are in the home currency and political risk is hedged with net zero exposure to the P-factor. Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
					(a) US				
β_P	-0.01	0.12*	0.34*	0.00	0.34*	0.35*	0.01	0.22*	-0.12*
	(0.57)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.82)	(0.00)	(0.01)
Av. excess return	0.52	0.71	1.36	1.02	0.33	0.83	0.50	0.64	0.31
CVaR	9.90	12.16	12.86	11.26	1.60	2.96	1.36	0.70	-0.90
MtC	0.053	0.059	0.106	0.091	0.015	0.053*	0.038*	0.047*	0.032*
					(0.24)	(0.06)	(0.10)	(0.01)	(0.02)
Sharpe	0.12	0.13	0.21	0.19	0.02	0.09*	0.07	0.08*	0.06*
					(0.66)	(0.10)	(0.15)	(0.03)	(0.04)
					(b) Eurozone				
β_P	0.04	0.16*	0.31*	0.00	0.31*	0.27*	-0.04	0.15*	-0.16*
	(0.22)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.44)	(0.01)	(0.00)
Av. excess return	0.36	0.68	1.27	0.95	0.32	0.91	0.59	0.59	0.27
CVaR	12.16	10.80	10.69	10.64	0.05	-1.47	-1.52	-0.11	-0.16
MtC	0.030	0.063	0.119	0.090	0.029	0.089*	0.060*	0.055*	0.026*
					(0.13)	(0.00)	(0.00)	(0.00)	(0.04)
Sharpe	0.07	0.15	0.24	0.22	0.02	0.16*	0.14*	0.09*	0.07*
					(0.67)	(0.00)	(0.00)	(0.02)	(0.07)
					(c) Japan				
β_P	0.04	0.14*	0.42*	0.00	0.42*	0.38*	-0.04	0.28*	-0.14*
	(0.41)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.55)	(0.00)	(0.02)
Av. excess return	0.47	0.88	1.59	1.16	0.43	1.13	0.70	0.71	0.28
CVaR	10.54	13.50	14.56	12.97	1.59	4.02	2.43	1.06	-0.53
MtC	0.044	0.065	0.109	0.090	0.020	0.065*	0.045*	0.044*	0.024*
					(0.19)	(0.04)	(0.09)	(0.01)	(0.03)
Sharpe	0.09	0.15	0.22	0.20	0.01	0.12*	0.11*	0.07*	0.06*
					(0.75)	(0.03)	(0.05)	(0.05)	(0.03)

Table 4 – Hedging political and currency risk of international portfolios

This table reports performance statistics of portfolios with hedged currency risk, namely of the MSCI home market index (I) and internationally diversified portfolios using equally weighted (EW) and mean-to-CVaR unrestricted optimal portfolios (U) and with political risk hedging (H). Political risk is hedged with net zero exposure to the P-factor. Currency hedging is unitary, using index hedged returns converted to the local currency using forward contracts or futures, when available, or estimated with synthetic replication as the difference between local returns and the local risk-free rate. Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
(a) US									
β_P	-0.01	0.13*	0.11*	0.00	0.11*	0.12*	0.01	-0.02	-0.13*
	(0.57)	(0.00)	(0.00)	(1.00)	(0.02)	(0.00)	(0.80)	(0.63)	(0.00)
Av. excess return	0.52	0.55	0.82	0.92	-0.10	0.29	0.40	0.26	0.37
CVaR	9.90	9.80	7.63	9.74	-2.12	-2.27	-0.15	-2.18	-0.06
MtC	0.053	0.056	0.107	0.094	0.013	0.054*	0.041*	0.051*	0.038*
					(0.25)	(0.06)	(0.05)	(0.01)	(0.01)
Sharpe	0.12	0.13	0.21	0.22	-0.01	0.09	0.10*	0.07*	0.08*
					(0.76)	(0.13)	(0.06)	(0.05)	(0.02)
(b) Eurozone									
β_P	0.04	0.13*	0.11*	0.00	0.11*	0.07	-0.04	-0.02	-0.13*
	(0.22)	(0.00)	(0.00)	(1.00)	(0.06)	(0.17)	(0.46)	(0.64)	(0.00)
Av. excess return	0.36	0.51	0.89	0.90	-0.01	0.52	0.53	0.38	0.39
CVaR	12.16	9.90	8.34	9.69	-1.34	-3.82	-2.47	-1.56	-0.22
MtC	0.030	0.051	0.106	0.093	0.013	0.076*	0.063*	0.055*	0.042*
					(0.22)	(0.02)	(0.01)	(0.01)	(0.01)
Sharpe	0.07	0.12	0.21	0.21	0.00	0.13*	0.13*	0.09*	0.09*
					(0.98)	(0.02)	(0.01)	(0.04)	(0.04)
(c) Japan									
β_P	0.04	0.13*	0.11*	0.00	0.11*	0.07	-0.04	-0.02	-0.13*
	(0.41)	(0.00)	(0.00)	(1.00)	(0.04)	(0.28)	(0.50)	(0.56)	(0.00)
Av. excess return	0.47	0.51	0.81	0.87	-0.07	0.34		0.30	0.37
CVaR	10.54	9.85	7.96	9.77	-1.81	-2.58	-0.77	-1.89	-0.08
MtC	0.044	0.052	0.101	0.089	0.012	0.057*	0.045*	0.050*	0.038*
					(0.26)	(0.07)	(0.09)	(0.01)	(0.01)
Sharpe	0.09	0.12	0.19	0.21	-0.01	0.10	0.11*	0.07*	0.08*
					(0.73)	(0.13)	(0.08)	(0.06)	(0.02)

Table 5 – Managing political risk in emerging markets

This table reports performance statistics of portfolios diversified into emerging markets, at four points of the MtC-β_P political efficient frontier with limits on the exposure to the global political risk factor. Reported is the monthly performance ratios mean-to-CVaR (MtC), and the gains over the index I and EW portfolios from Table 3. "U" denotes the unconstrained portfolio at the peak of the political frontier. The sample includes the home country and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	U	Limited β_P portfolios		
	(a) US			
β_P	0.45*	0.30*	0.20*	0.10*
	(0.00)	(0.00)	(0.00)	(0.09)
Av. excess return	1.49	1.26	1.12	0.96
CVaR	14.26	12.11	11.17	10.49
MtC	0.104	0.104	0.100	0.092
MtC gains over I		0.051*	0.047	0.039
		(0.09)	(0.11)	(0.12)
MtC gains over EW		0.027*	0.024*	0.015
		(0.04)	(0.07)	(0.17)
	(b) Eurozone			
β_P	0.49*	0.30*	0.20*	0.10
	(0.00)	(0.00)	(0.00)	(0.18)
Av. excess return	1.57	1.19	1.06	0.95
CVaR	13.40	10.46	9.77	11.46
MtC	0.117	0.114	0.109	0.083
MtC gains over I		0.084*	0.079*	0.053*
		(0.01)	(0.01)	(0.03)
MtC gains over EW		0.034*	0.028*	0.003
		(0.02)	(0.04)	(0.44)
	(c) Japan			
β_P	0.45*	0.30*	0.20*	0.10
	(0.00)	(0.00)	(0.00)	(0.13)
Av. excess return	1.62	1.35	1.22	1.01
CVaR	14.92	12.85	12.51	12.39
MtC	0.108	0.105	0.098	0.081
MtC gains over I		0.061*	0.054*	0.037
		(0.05)	(0.07)	(0.11)
MtC gains over EW		0.025*	0.018*	0.001
		(0.04)	(0.10)	(0.46)

Table 6 – Political risk hedging for long-horizon investors

This table reports the monthly MtC performance measure at different horizons of the MSCI home market index I with internationally diversified mean-to-CVaR optimal unrestricted (U) and hedged (H) portfolios. Political risk is hedged with net zero exposure to the P-factor. The horizon ranges from 1 to 120 months, and for inter-temporal comparison we normalize CVaR around the mean. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	1	3	6	12	20	40	60	80	120
					(a) US				
H - I	0.033	0.057*	0.080*	0.112*	0.189*	0.391*	0.509*	0.559*	0.728*
	(0.11)	(0.10)	(0.07)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
H - U	-0.012	-0.011	-0.009	-0.015	-0.007	0.024	0.268*	0.319*	0.347*
	(0.24)	(0.35)	(0.38)	(0.35)	(0.43)	(0.36)	(0.01)	(0.00)	(0.00)
U - I	0.045*	0.068*	0.090*	0.127*	0.196*	0.367*	0.241*	0.240*	0.381*
	(0.08)	(0.10)	(0.09)	(0.04)	(0.02)	(0.00)	(0.01)	(0.01)	(0.01)
					(b) Eurozone				
H - I	0.053*	0.080*	0.100*	0.149*	0.216*	0.445*	0.712*	0.828*	1.243*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.024	-0.025	-0.035	-0.025	-0.032	-0.067	0.136*	0.398*	0.527*
	(0.12)	(0.20)	(0.18)	(0.27)	(0.23)	(0.22)	(0.02)	(0.01)	(0.02)
U - I	0.077*	0.106*	0.135*	0.174*	0.248*	0.512*	0.576*	0.430*	0.716*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
					(c) Japan				
H - I	0.040*	0.063*	0.086*	0.136*	0.225*	0.459*	0.495*	0.751*	1.044*
	(0.09)	(0.09)	(0.06)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.016	-0.013	-0.025	-0.009	0.005	0.051	0.072	0.273*	0.389*
	(0.19)	(0.32)	(0.23)	(0.42)	(0.45)	(0.13)	(0.11)	(0.01)	(0.01)
U - I	0.056*	0.076*	0.111*	0.146*	0.220*	0.408*	0.423*	0.478*	0.655*
	(0.04)	(0.08)	(0.05)	(0.04)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)

Table 7 – Diversifying political risk with short positions

This table reports performance of international portfolios when we allow for short sales in developed, but not in emerging, markets. Statistics are reported for the MSCI home market index (I), and internationally diversified portfolios using equally weighted (EW) and mean-to-CVaR unrestricted optimal portfolios (U) and with political risk hedging (H). Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
				(a) US					
β_P	-0.01	0.12*	0.09	0.00	0.09	0.10*	0.01	-0.03	-0.12*
	(0.57)	(0.00)	(0.13)	(1.00)	(0.17)	(0.05)	(0.83)	(0.52)	(0.02)
Av. excess return	0.52	0.71	1.28	1.23	0.05	0.76	0.71	0.57	0.52
CVaR	9.90	12.16	6.82	6.68	0.14	-3.08	-3.22	-5.34	-5.48
MtC	0.053	0.059	0.188	0.185	0.004	0.135*	0.132*	0.129*	0.126*
					(0.39)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.12	0.13	0.30	0.30	0.00	0.18*	0.18*	0.17*	0.17*
					(0.94)	(0.01)	(0.01)	(0.01)	(0.01)
				(b) Eurozone					
β_P	0.04	0.16*	0.15*	0.00	0.15*	0.11*	-0.04	-0.01	-0.16*
	(0.22)	(0.00)	(0.02)	(1.00)	(0.08)	(0.09)	(0.59)	(0.81)	(0.02)
Av. excess return	0.36	0.68	1.55	1.77	-0.21	1.19	1.40	0.87	1.08
CVaR	12.16	10.80	6.19	7.45	-1.25	-5.97	-4.71	-4.60	-3.35
MtC	0.030	0.063	0.251	0.237	0.013	0.221*	0.207*	0.187*	0.174*
					(0.35)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.07	0.15	0.34	0.34	0.00	0.27*	0.27*	0.19*	0.19*
					(0.95)	(0.00)	(0.00)	(0.00)	(0.01)
				(c) Japan					
β_P	0.04	0.14*	0.08	0.00	0.08	0.04	-0.04	-0.06	-0.14*
	(0.41)	(0.00)	(0.29)	(1.00)	(0.35)	(0.59)	(0.61)	(0.44)	(0.06)
Av. excess return	0.47	0.88	1.69	1.69	0.00	1.22	1.22	0.81	0.81
CVaR	10.54	13.50	8.82	9.04	-0.22	-1.72	-1.50	-4.69	-4.46
MtC	0.044	0.065	0.192	0.187	0.005	0.147*	0.143*	0.126*	0.122*
					(0.34)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.09	0.15	0.30	0.30	0.00	0.21*	0.21*	0.15*	0.16*
					(0.84)	(0.00)	(0.00)	(0.01)	(0.01)

Table 8 – Hedging political risk with model implied returns

This table reports portfolio performance statistics with portfolios constructed using returns obtained from a pricing model of political risk, by estimating factor loadings with time-series regressions of country excess returns on the market portfolio and the P-factor over the whole sample. Returns are obtained by multiplying the estimated country factor loadings by the corresponding factor at each time period plus independent Gaussian noise with zero mean and the standard deviation of the country index. We report averages from 5,000 repetitions of the exposure of each portfolio to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. Results are reported for the MSCI home market index I and internationally diversified portfolios using the model implied returns, for equally weighted EW and mean-to-CVaR unrestricted optimal portfolios (U) and with political risk hedging (H). The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
(a) US									
β_P	-0.01	0.12*	0.22*	0.00	0.22*	0.23*	0.01	0.10*	-0.12*
	(0.57)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.53)	(0.00)	(0.00)
Av. excess return	0.52	0.57	1.37	1.13	0.24	0.85	0.61	0.80	0.56
CVaR	9.90	11.87	11.35	11.22	0.13	1.45	1.32	-0.52	-0.65
Mean-to-CVaR	0.053	0.048	0.121	0.101	0.020*	0.068*	0.048*	0.073*	0.053*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.12	0.11	0.22	0.20	0.02*	0.10*	0.08*	0.11*	0.09*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(b) Eurozone									
β_P	0.04	0.16*	0.21*	0.00	0.21*	0.17*	-0.04	0.05*	-0.16*
	(0.22)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.24)	(0.00)	(0.00)
Av. excess return	0.36	0.47	1.09	0.85	0.24	0.73	0.48	0.62	0.38
CVaR	12.16	9.02	8.03	8.89	-0.86	-4.14	-3.27	-0.99	-0.13
Mean-to-CVaR	0.030	0.052	0.137	0.096	0.041*	0.107*	0.066*	0.084*	0.043*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.07	0.12	0.24	0.19	0.05*	0.16*	0.11*	0.12*	0.07*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(c) Japan									
β_P	0.04	0.14*	0.23*	0.00	0.23*	0.19*	-0.04	0.09*	-0.14*
	(0.41)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.41)	(0.00)	(0.00)
Avg excess return	0.47	0.59	1.41	1.16	0.25	0.95	0.70	0.82	0.57
CVaR	10.54	12.04	11.40	11.54	-0.14	0.86	1.00	-0.65	-0.50
Mean-to-CVaR	0.044	0.049	0.124	0.101	0.024*	0.080*	0.057*	0.075*	0.052*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.09	0.11	0.23	0.20	0.03*	0.13*	0.10*	0.11*	0.08*
					(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 9 – Selective currency risk hedging of politically hedged portfolios

This table reports performance statistics of the MSCI home market index I and internationally diversified portfolios with selective currency hedging, using equally weighted EW and mean-to-CVaR unrestricted optimal portfolios (U) and with hedging (H) political risk. Currency hedging is determined by the optimization model investing selectively in the unhedged index, or in hedged returns converted to the local currency using forward contracts or futures, when available, or estimated with synthetic replication as the difference between local returns and the local risk-free rate. Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
					(a) US				
β_P	-0.01	0.13*	0.14*	0.00	0.14*	0.15*	0.01	0.02	-0.13*
	(0.57)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.80)	(0.65)	(0.00)
Av. excess return	0.52	0.64	0.91	0.96	-0.04	0.39	0.43	0.28	0.32
CVaR	9.90	10.93	8.02	9.74	-1.71	-1.87	-0.16	-2.91	-1.20
MtC	0.053	0.058	0.114	0.098	0.016	0.061*	0.045*	0.056*	0.040*
					(0.21)	(0.05)	(0.05)	(0.00)	(0.00)
Sharpe	0.12	0.13	0.22	0.22	0.00	0.10*	0.10*	0.09*	0.08*
					(0.93)	(0.07)	(0.06)	(0.01)	(0.02)
					(b) Eurozone				
β_P	0.04	0.16*	0.34*	0.00	0.34*	0.31*	-0.04	0.18*	-0.16*
	(0.22)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.43)	(0.00)	(0.00)
Av. excess return	0.36	0.64	1.31	0.93	0.38	0.95	0.57	0.67	0.29
CVaR	12.16	10.14	10.63	9.90	0.73	-1.53	-2.26	0.50	-0.23
MtC	0.030	0.063	0.123	0.094	0.029	0.093*	0.064*	0.060*	0.030*
					(0.16)	(0.01)	(0.00)	(0.01)	(0.02)
Sharpe	0.07	0.15	0.23	0.22	0.01	0.16*	0.15*	0.09*	0.07*
					(0.79)	(0.01)	(0.00)	(0.04)	(0.05)
					(c) Japan				
β_P	0.04	0.14*	0.27*	0.00	0.27*	0.23*	-0.04	0.13*	-0.14*
	(0.41)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.51)	(0.02)	(0.00)
Av. excess return	0.47	0.70	1.27	0.98	0.30	0.81	0.51	0.58	0.28
CVaR	10.54	11.54	11.26	10.19	1.07	0.72	-0.35	-0.27	-1.35
MtC	0.044	0.060	0.113	0.096	0.017	0.069*	0.052*	0.053*	0.035*
					(0.21)	(0.04)	(0.06)	(0.01)	(0.01)
Sharpe	0.09	0.14	0.23	0.22	0.01	0.14*	0.12*	0.09*	0.08*
					(0.78)	(0.03)	(0.04)	(0.02)	(0.02)

Table 10 – Out-of-sample test

This table reports performance statistics for 204 repetitions of out-of-sample testing on a 48-month rolling window of mean-to-CVaR unrestricted optimal portfolios (U) and with hedging (H) political risk, of the MSCI home market index I, and internationally diversified portfolios using equally weighted EW. Portfolio rebalancing incurs a one way transaction cost of 0.2%. Currency hedging is determined by the model investing selectively in the unhedged index return or in hedged returns, converted to the local currency using forward contracts or futures, when available, or estimated with synthetic replication as the difference between local returns and the local risk-free rate. Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
					(a) US				
Average $\mid \beta_P \mid$	-0.08*	0.15*	0.22*	0.00	0.22*	0.30*	0.08*	0.07*	-0.15*
	(0.00)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)
Avg excess return	0.80	0.44	1.08	1.06	0.02	0.28	0.26	0.64	0.62
CVaR	9.44	11.48	12.53	10.53	2.00	3.08	1.09	1.05	-0.95
Mean-to-CVaR	0.085	0.038	0.086	0.100	-0.014	0.001	0.016	0.048*	0.062*
					(0.51)	(0.16)	(0.15)	(0.00)	(0.00)
Sharpe	0.20	0.10	0.18	0.23	-0.04	-0.02	0.03	0.09*	0.13*
					(0.39)	(0.90)	(0.52)	(0.07)	(0.01)
					(b) Eurozone				
Average $\mid \beta_P \mid$	0.02	0.15*	0.23*	0.00	0.23*	0.21*	-0.02	0.08*	-0.15*
	(0.64)	(0.00)	(0.00)	(1.00)	(0.00)	(0.00)	(0.63)	(0.05)	(0.00)
Avg excess return	0.65	0.47	1.12	1.01	0.11	0.46	0.35	0.64	0.53
CVaR	10.54	10.22	11.21	8.07	3.13	0.67	-2.47	0.98	-2.15
Mean-to-CVaR	0.062	0.046	0.100	0.125	-0.025	0.038*	0.063*	0.053*	0.078*
					(0.46)	(0.10)	(0.09)	(0.01)	(0.02)
Sharpe	0.14	0.12	0.20	0.24	-0.03	0.06	0.10	0.09	0.12
					(0.96)	(0.30)	(0.24)	(0.17)	(0.12)
					(c) Japan				
Average $\mid \beta_P \mid$	0.12	0.13*	0.23*	0.00	0.23*	0.11	-0.12	0.10*	-0.13*
	(0.14)	(0.00)	(0.00)	(1.00)	(0.00)	(0.14)	(0.11)	(0.02)	(0.00)
Avg excess return	0.62	0.47	0.97	1.01	-0.05	0.35	0.62	0.50	0.54
CVaR	10.99	12.39	14.51	11.16	3.35	3.53	10.99	2.12	-1.23
Mean-to-CVaR	0.056	0.038	0.067	0.091	-0.024	0.010*	0.056*	0.029*	0.053*
					(0.36)	(0.06)	(0.08)	(0.01)	(0.03)
Sharpe	0.12	0.09	0.16	0.21	-0.04	0.04	0.08	0.07*	0.11*
					(0.91)	(0.17)	(0.14)	(0.09)	(0.04)

Table 11 – Hedging political risk with transaction costs

This table reports performance statistics on portfolio performance with varying level of transaction costs in developed (c_d) and emerging (c_e) markets. Results are reported for the MSCI home market index I and internationally diversified portfolios using equally weighted EW and mean-to-CVaR unrestricted optimal portfolios (U) and with political risk hedging (H). Reported are also the exposures to a global political risk factor β_P, and the monthly performance ratios mean-to-CVaR (MtC) and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

Transaction costs			I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
					(a) US						
$c_d = 0.0\%$	$c_e = 0.0\%$	MtC	0.053	0.059	0.106	0.091	0.015	0.053*	0.038*	0.047*	0.032*
							(0.23)	(0.06)	(0.10)	(0.01)	(0.01)
		Sharpe	0.12	0.13	0.21	0.19	0.02	0.09*	0.07	0.08*	0.06*
							(0.66)	(0.10)	(0.15)	(0.03)	(0.04)
$c_d = 0.2\%$	$c_e = 0.2\%$	MtC	0.032	0.042	0.089	0.072	0.017	0.057*	0.040*	0.048*	0.030*
							(0.24)	(0.05)	(0.08)	(0.02)	(0.02)
		Sharpe	0.07	0.10	0.18	0.16	0.02	0.10*	0.08	0.08*	0.06*
							(0.65)	(0.08)	(0.11)	(0.04)	(0.04)
$c_d = 0.2\%$	$c_e = 0.4\%$	MtC	0.032	0.034	0.079	0.065	0.014	0.047*	0.033*	0.045*	0.031*
							(0.25)	(0.07)	(0.10)	(0.01)	(0.00)
		Sharpe	0.07	0.08	0.16	0.15	0.01	0.08*	0.07	0.08*	0.07*
							(0.74)	(0.10)	(0.11)	(0.02)	(0.01)
$c_d = 0.2\%$	$c_e = 0.5\%$	MtC	0.032	0.030	0.074	0.062	0.012	0.042*	0.030*	0.044*	0.033*
							(0.28)	(0.08)	(0.10)	(0.01)	(0.00)
		Sharpe	0.07	0.07	0.15	0.14	0.01	0.08	0.07	0.08*	0.07*
							(0.86)	(0.14)	(0.11)	(0.02)	(0.00)
					(b) Eurozone						
$c_d = 0.0\%$	$c_e = 0.0\%$	MtC	0.030	0.063	0.119	0.090	0.030	0.089*	0.060*	0.056*	0.026*
							(0.12)	(0.00)	(0.00)	(0.00)	(0.04)
		Sharpe	0.07	0.15	0.24	0.22	0.02	0.16*	0.14*	0.09*	0.07*
							(0.65)	(0.00)	(0.00)	(0.01)	(0.06)
$c_d = 0.2\%$	$c_e = 0.2\%$	MtC	0.013	0.044	0.101	0.070	0.032	0.088*	0.057*	0.057*	0.026*
							(0.15)	(0.00)	(0.00)	(0.01)	(0.04)
		Sharpe	0.03	0.11	0.19	0.17	0.02	0.16*	0.14*	0.08*	0.07*
							(0.74)	(0.01)	(0.00)	(0.04)	(0.07)
$c_d = 0.2\%$	$c_e = 0.4\%$	MtC	0.013	0.035	0.087	0.064	0.023	0.074*	0.051*	0.052*	0.029*
							(0.21)	(0.01)	(0.00)	(0.01)	(0.02)
		Sharpe	0.03	0.09	0.17	0.16	0.01	0.14*	0.13*	0.08*	0.08*
							(0.88)	(0.02)	(0.00)	(0.04)	(0.03)
$c_d = 0.2\%$	$c_e = 0.5\%$	MtC	0.013	0.031	0.081	0.063	0.018	0.068*	0.050*	0.051*	0.033*
							(0.25)	(0.01)	(0.00)	(0.01)	(0.02)
		Sharpe	0.03	0.08	0.16	0.16	0.00	0.13*	0.12*	0.09*	0.08*
							(0.94)	(0.02)	(0.00)	(0.03)	(0.02)
					(c) Japan						
$c_d = 0.0\%$	$c_e = 0.0\%$	MtC	0.044	0.065	0.109	0.090	0.020	0.065*	0.045*	0.044*	0.024*
							(0.19)	(0.03)	(0.09)	(0.01)	(0.03)
		Sharpe	0.09	0.15	0.22	0.20	0.01	0.12*	0.11*	0.07*	0.06*
							(0.75)	(0.03)	(0.05)	(0.05)	(0.03)
$c_d = 0.2\%$	$c_e = 0.2\%$	MtC	0.025	0.050	0.094	0.073	0.021	0.070*	0.048*	0.045*	0.023*
							(0.17)	(0.02)	(0.07)	(0.01)	(0.03)
		Sharpe	0.05	0.11	0.19	0.17	0.02	0.14*	0.12*	0.08*	0.06*
							(0.59)	(0.02)	(0.04)	(0.03)	(0.05)
$c_d = 0.2\%$	$c_e = 0.4\%$	MtC	0.025	0.042	0.082	0.068	0.015	0.058*	0.043*	0.040*	0.026*
							(0.25)	(0.05)	(0.08)	(0.01)	(0.01)
		Sharpe	0.05	0.10	0.17	0.16	0.01	0.12*	0.11*	0.07*	0.06*
							(0.82)	(0.04)	(0.04)	(0.05)	(0.00)
$c_d = 0.2\%$	$c_e = 0.5\%$	MtC	0.025	0.039	0.077	0.066	0.011	0.053*	0.042*	0.039*	0.028*
							(0.30)	(0.06)	(0.08)	(0.02)	(0.01)
		Sharpe	0.05	0.09	0.16	0.16	0.00	0.11*	0.11*	0.07*	0.07*
							(0.95)	(0.06)	(0.04)	(0.05)	(0.00)

Online Appendix

A Background results and proofs

We start with some background results relating to CVaR and stochastic dominance.

Definition A.1 (Conditional Value-at-Risk, CVaR). *The conditional Value-at-Risk at confidence level $\alpha \in (0,1)$ for a continuously distributed random portfolio return $\tilde{r}_p$ is*

$$\mathrm{CVaR}_\alpha(\tilde{r}_p) = -\mathbb{E}[\tilde{r}_p \mid \tilde{r}_p \leq \zeta], \tag{14}$$

where $\mathbb{E}$ is the expectation operator and $\zeta_{1-\alpha} \in \mathbb{R}$ is the Value-at-Risk.

We point out that Rockafellar and Uryasev (2002) develop their model for a loss random variable $\tilde{z}$ and not for returns. Their CVaR of losses is the expected value *above* a threshold ζ, whereas we take the CVaR of return to be the negative of expected value *below* the $1-\alpha$ probability threshold ζ. We use their results with $\tilde{z} = -\tilde{r}_p$.

Value-at-Risk is the highest γ such that $\tilde{r}_p$ will not exceed γ with probability $1-\alpha$,

$$\mathrm{VaR}_{1-\alpha}(\tilde{r}_p) \doteq \zeta_{1-\alpha} = \max\{\gamma \in \mathbb{R} \mid \mathrm{Prob}(\tilde{r}_p \leq \gamma) \leq 1-\alpha\}. \tag{15}$$

By definition, $\zeta_{1-\alpha}$ is the $(1-\alpha)$-quantile of the random variable $\tilde{r}_p$. It depends on the portfolio x and the confidence level α, and so does CVaR. For simplicity we drop the confidence level subscript.

Theorem A.1 (Fundamental minimization formula). (Rockafellar and Uryasev, 2002) *As a function of $\gamma \in \mathbb{R}$, the auxiliary function*

$$F_\alpha(\tilde{r}_p, \gamma) = \gamma + \frac{1}{1-\alpha}\mathbb{E}\big[\max\{-\tilde{r}_p - \gamma, 0\}\big]$$

is finite and convex, with

$$\mathrm{CVaR}_\alpha(\tilde{r}_p) = \min_{\gamma \in \mathbb{R}} F_\alpha(\tilde{r}_p, \gamma).$$

Definition A.2 (Stochastic dominance). *Random variable $\tilde{X}$ dominates random variable $\tilde{Y}$ under first order stochastic dominance (FSD, $\tilde{X} \succeq_{FSD} \tilde{Y}$) if $\mathbb{E}(U(\tilde{X})) \geq \mathbb{E}(U(\tilde{Y}))$ for all increasing utility functions U. Similarly, $\tilde{X}$ dominates random variable $\tilde{Y}$ under second order stochastic dominance (SSD, $\tilde{X} \succeq_{SSD} \tilde{Y}$) if $\mathbb{E}(U(\tilde{X})) \geq \mathbb{E}(U(\tilde{Y}))$ for all increasing concave utility functions U. (Ingersoll, 1987, p. 85).*

Definition A.3 (Risk measure consistency). *Given a stochastic order $\succeq_{SSD}$ we say that a risk measure ρ is SSD consistent if $\tilde{X} \succeq_{SSD} \tilde{Y}$ implies $\rho(\tilde{X}) \leq \rho(\tilde{Y})$. (Ogryczak and Ruszczyński, 2002)*

A.1 Proof of Proposition 2.1

To obtain (2),

$$\begin{aligned}\mathrm{CVaR}(\tilde{r}_c) &= \min_{\gamma\in\mathbb{R}} \gamma + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{-(y\tilde{r}_p + (1-y)r_f) - \gamma, 0\}\big] \\ &= \min_{\gamma'\in\mathbb{R}} \gamma' + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{-y\tilde{r}_p - \gamma', 0\}\big] - (1-y)r_f\end{aligned}$$

where $\gamma' = \gamma + (1-y)r_f$. Given that $y > 0$,

$$\begin{aligned}\mathrm{CVaR}(\tilde{r}_c) &= \min_{\gamma'\in\mathbb{R}} \gamma' + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{-y\tilde{r}_p - \gamma', 0\}\big] - (1-y)r_f \\ &= \min_{\gamma''\in\mathbb{R}} y\gamma'' + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{y(-\tilde{r}_p - \gamma''), 0\}\big] - (1-y)r_f\end{aligned}$$

where $y\gamma'' = \gamma'$. Finally,

$$\begin{aligned}\mathrm{CVaR}(\tilde{r}_c) &= \min_{\gamma''\in\mathbb{R}} y\gamma'' + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{y(-\tilde{r}_p - \gamma''), 0\}\big] - (1-y)r_f \\ &= y\left[\min_{\gamma''\in\mathbb{R}} \gamma'' + \frac{1}{(1-\alpha)}\mathbb{E}\big[\max\{-\tilde{r}_p - \gamma'', 0\}\big]\right] - (1-y)r_f\end{aligned}$$

which is equal to $y\mathrm{CVaR}(\tilde{r}_p) - (1-y)r_f$, completing the proof.

A.2 Linear programming formulations for MtC optimization

We follow Rockafellar and Uryasev (2002) to formulate a linear program for MtC optimization when the random asset returns take discrete values from a finite set of equiprobable scenarios in $\mathbb{R}^n$, of cardinality S. For NSS we arrive at a linear program that is identical to that of Stoyanov, Rachev, and Fabozzi (2007), but our derivation is simpler and we give it for completeness. The model with short sales is new. We develop the model for linear portfolios, but similar analysis carries over to non-linear positions $\tilde{r}_p = f(x, \tilde{r})$, resulting into non-linearly constrained optimization models. We note that CVaR under normality is given by $\mathrm{CVaR}_\alpha(\tilde{r}_p) = -\bar{r}_p + \kappa_{1-\alpha}\sigma_{\tilde{r}_p}$, where $\bar{r}_p$ and $\sigma_{\tilde{r}_p}$ are the mean and standard deviation of $\tilde{r}_p$, and $\kappa_{1-\alpha} = \frac{1}{1-\alpha}\phi(\Psi^{-1}(1-\alpha))$ with ϕ and Ψ the normal density and cumulative distribution functions, respectively. In this case the Sharpe ratio portfolio is a solution of model (6), and the models we develop apply to Sharpe ratio maximization.

Let R denote the $S \times n$ matrix of return scenarios. From Theorem A.1 the CVaR of portfolio x is the optimal value of the linear program

$$\begin{aligned} \min_{u \in \mathbb{R}^S, \gamma \in \mathbb{R}} \quad & \gamma + \frac{1}{S(1-\alpha)} e^\top u \\ \text{s.t.} \quad & -u - e\gamma \leq Rx \\ & u \geq 0, \end{aligned} \tag{16}$$

where e is an n-dimensional vector of 1. Consider first the NSS case.

Theorem A.2 (MtC optimization)**.** *Assuming positive CVaR on excess returns of every portfolio in the feasible set (7), then MtC maximization is expressed as*

$$\begin{aligned} \max_{x' \in \mathbb{R}^n, u' \in \mathbb{R}^S, \gamma' \in \mathbb{R}} \quad & (\bar{r} - r_f e)^\top x' \\ s.t. \quad & \gamma' + \frac{1}{S(1-\alpha)} e^\top u' = 1 \\ & -R_e x' - u' - e\gamma' \leq 0 \\ & e^\top x' > 0 \\ & u', \, x' \geq 0, \end{aligned} \tag{17}$$

where R_e denotes the $S \times n$ matrix of excess returns. Given x'^*, the optimal solution of (17), the optimal solution of (6) is $x^* = \frac{1}{e^\top x'^*} x'^*$.

Proof. Given the assumption that at the optimal solution $\text{CVaR}^*(\tilde{r}_p - r_f) \geq \delta > 0$, we can find a neighborhood for which $\text{CVaR}(\tilde{r}_p - r_f) > 0$. We define $\xi = \text{CVaR}(\tilde{r}_p - r_f) > 0$, and break the objective function (6) in two components to obtain

$$\begin{aligned} \max_{x \in \mathbb{X}, \, \xi \in \mathbb{R}} \quad & \bar{r}^\top \frac{x}{\xi} - r_f \frac{1}{\xi} \\ \text{s.t.} \quad & \text{CVaR}(\tilde{r}_p - r_f) = \xi \\ & \xi > 0. \end{aligned} \tag{18}$$

Using the definition of CVaR from (16) and setting $x' = \frac{x}{\xi}$, $\nu = \frac{1}{\xi}$, $u' = \frac{u}{\xi}$, and $\gamma' = \frac{\gamma}{\xi}$, we rewrite the MtC maximization model as

$$\begin{aligned} \max_{x' \in \mathbb{R}^n, u' \in \mathbb{R}^S, \gamma', \nu \in \mathbb{R}} \quad & \bar{r}^\top x' - r_f \nu \\ \text{s.t.} \quad & \gamma' + \frac{1}{S(1-\alpha)} e^\top u' = 1 \\ & -R_e x' - u' - e\gamma' \leq 0 \\ & e^\top x' = \nu \\ & u' \geq 0, \, x' \geq 0, \, \nu > 0. \end{aligned} \tag{19}$$

Substituting $e^\top x'$ for $\nu > 0$ in the objective function by the constraint $e^\top x' > 0$, we get (17), completing the proof. $\square$

We consider the LS case with covered short positions, i.e., constraint set $\mathbb{X}_S$ (eqn. 8).

Theorem A.3. *Assuming that the* CVaR *on excess returns of every portfolio in the feasible set (8) is positive, then MtC portfolio optimization with covered short position is expressed as*

$$\begin{aligned}
\max_{x'^{+},\, x'^{-}\in\mathbb{R}^n,\, u'\in\mathbb{R}^S,\, \gamma'\in\mathbb{R}} \quad & \bar{r}^\top(x'^{+}-x'^{-}) - r_f e^\top(x'^{+}-x'^{-}) \\
s.t. \quad & \gamma' + \frac{1}{S(1-\alpha)} e^\top u' = 1 \\
& -R_e x'^{+} + R_e x'^{-} - u' - e\gamma' \leq 0 \\
& e^\top x'^{+} - e^\top x'^{-} > 0 \\
& 2e^\top x'^{-} - e^\top x'^{+} \leq 0 \\
& u' \geq 0,\ x'^{+},\ x'^{-} \geq 0,
\end{aligned} \tag{20}$$

where R_e shows the matrix of excess returns of dimensions of $S \times n$. Given $x_*'^{+}$ and $x_*'^{-}$, the optimal solutions of (20), the optimal solution of maximum MtC portfolio optimization can be obtained as $x_* = \frac{1}{e^\top x'_*} x'_*$ where $x'_* = x_*'^{+} - x_*'^{-}$.

Proof. Following the same procedure as in Theorem A.2, we can define $\xi = \text{CVaR}(\tilde{r}_p - r_f) > 0$, and break the objective function from (6) in two component as below:

$$\begin{aligned}
\max_{x\in\mathbb{X}_S,\, \xi\in\mathbb{R}} \quad & \bar{r}^\top \frac{x^+}{\xi} - \bar{r}^\top \frac{x^-}{\xi} - r_f \frac{1}{\xi} \\
\text{s.t.} \quad & \text{CVaR}(\tilde{r}_p - r_f) = \xi \\
& \xi > 0.
\end{aligned} \tag{21}$$

Setting $x'^{+} = \frac{x}{\xi}$, $x'^{-} = \frac{x}{\xi}$, $\nu = \frac{1}{\xi}$, $u' = \frac{u}{\xi}$ and $\gamma' = \frac{\gamma}{\xi}$, we have

$$\begin{aligned}
\max_{x'^{+},\, x'^{-}\in\mathbb{R}^n,\, u'\in\mathbb{R}^S,\, \gamma'\in\mathbb{R}} \quad & \bar{r}^\top x'^{+} - \bar{r}^\top x'^{-} - r_f \nu \\
\text{s.t.} \quad & \gamma' + \frac{1}{S(1-\alpha)} e^\top u' = 1 \\
& -R_e x'^{+} + R_e x'^{-} - u' - e\gamma' \leq 0 \\
& e^\top x'^{+} - e^\top x'^{-} = \nu \\
& e^\top x'^{-} \leq \nu \\
& u' \geq 0,\ x'^{+},\ x'^{-} \geq 0,\ \nu > 0.
\end{aligned} \tag{22}$$

Substituting $e^\top(x'^+ - x'^-)$ for ν ($\nu > 0$) in the objective function, while adding $e^\top(x'^+ - x'^-) > 0$ constraint, we get (20), completing the proof. $\square$

A.3 Proof of Theorem 2.2

Assumption:

(i) The sample $r_t = (r_{1,t}, r_{0,t})^\top$, $t = 1, 2, \ldots, S$, satisfies the moment and weak dependence conditions required so that the central limit theorem for the sequence $\{\bar{r}_S = (1/S)\sum_{t=1}^S r_t, S \in \mathbb{N}\}$ holds true. That is, the sequence $\{\sqrt{S}(\bar{r}_S - E(r_1)), S \in \mathbb{N}\}$ satisfies $\sqrt{S}(\bar{r}_S - E(r_1)) \xrightarrow{d} \mathcal{N}(0, \sum_{h\in\mathbb{Z}} Cov(r_t, r_{t+h}))$, as $S \to \infty$, with $0 < \sum_{h\in\mathbb{Z}} Cov(r_{j,t}, r_{j,t+h}) < \infty$, for $j \in \{1, 2\}$.

(ii) The distribution function F_j of $r_{j,t}$, $j \in \{0, 1\}$, is continuous and differentiable at $\zeta_{j,\beta}$ for any $\beta \in (0, 1)$ with positive derivative $f(\zeta_{j,\beta}) > 0$.

Notice that Assumption (i) is general enough and covers several interesting cases of processes. For instance, this assumption is satisfied if the process $\{r_t = (r_{1,t}, r_{0,t})^\top, t \in \mathbb{Z}\}$ is a martingale sequence; see Hall and Hyede (1980). It is also true if the same process satisfies some mixing type conditions, like α-mixing, see Imbragimov and Linnik (1971) or other types of weak dependence conditions. Assumption (ii) is a rather standard condition in CVaR analysis.

We now fix some notation to proceed with the proof. For a sequence $\{X_n\}$ of random variables defined on the same probability space, $X_n = o_P(1)$ states for converge of $\{X_n\}$ to zero in probability and $X_n = O_P(1)$ for boundedness of $\{X_n\}$ in probability. We write $X_n \xrightarrow{P} X$ for convergence of $\{X_n\}$ to X in probability and $X_n \xrightarrow{d} X$ for convergence in distribution. For a random variable X, let $X^- = -\min\{0, X\}$ and $X^+ = \max\{0, X\}$.

Let

$$\widetilde{R}_t = \big(r_{1,t}, -\frac{1}{1-\alpha} r_{1,t}\mathbb{1}(r_{1,t} \le \widehat{\zeta}_{1,1-\alpha}), r_{0,t}, -\frac{1}{1-\alpha} r_{0,t}\mathbb{1}(r_{0,t} \le \widehat{\zeta}_{0,1-\alpha})\big)^\top,$$

and consider the sequence $\{\widetilde{Y}_S, S \in \mathbb{N}\}$ where $\widetilde{Y}_S = (1/S)\sum_{t=1}^S \widetilde{R}_t$.

Let $\mu = (\mu_1, \mathrm{CVaR}_1, \mu_0, \mathrm{CVaR}_0)^\top$, where for $j \in \{0, 1\}$,

$$\mu_j = E(r_{j,t}), \quad \mathrm{CVaR}_j = -\frac{1}{1-\alpha} E\big(r_{j,t}\mathbb{1}(r_{j,t} \le \zeta_{j,1-\alpha})\big).$$

We first show that

$$\sqrt{S}(\widetilde{Y}_S - \mu) = \sqrt{S}(\overline{Y}_S - \mu) + o_P(1), \tag{23}$$

where $\overline{Y}_S = (1/S)\sum_{t=1}^{S} R_t$ with

$$R_t = \left(r_{1,t}, -\frac{1}{1-\alpha} r_{1,t}\mathbb{1}(r_{1,t} \leq \zeta_{1,1-\alpha}), r_{0,t}, -\frac{1}{1-\alpha} r_{0,t}\mathbb{1}(r_{0,t} \leq \zeta_{0,1-\alpha})\right)^\top.$$

Equation (23) follows if we show that

$$\sqrt{S}(\widehat{\text{CVaR}}_j - \text{CVaR}_j) = \frac{1}{\sqrt{S}(1-\alpha)} \sum_{t=1}^{S} \left\{(r_{j,t} - \zeta_{j,1-\alpha})^- - E(r_{j,t} - \zeta_{j,1-\alpha})^-\right\} + o_P(1), \quad (24)$$

holds true. To simplify notation, notice first that for $\ell_{j,t} = -r_{j,t}$, we have that

$$-\frac{1}{1-\alpha} E\left(r_{j,t}\mathbb{1}(r_{j,t} \leq \zeta_{j,1-\alpha})\right) = \frac{1}{1-\alpha} E\left(\ell_{j,t}\mathbb{1}(\ell_{j,t} \geq v_{j,\alpha})\right)$$

and

$$-\frac{1}{1-\alpha}\frac{1}{S}\sum_{t=1}^{S} r_{j,t}\mathbb{1}(r_{j,t} \leq \widehat{\zeta}_{j,1-\alpha}) = \frac{1}{1-\alpha}\frac{1}{S}\sum_{t=1}^{S} \ell_{j,t}\mathbb{1}(\ell_{j,t} \geq \widehat{v}_{j,\alpha}),$$

where $v_{j,\alpha} = \inf\{x : P(\ell_{j,t} \leq x) \geq \alpha\}$ and $\widehat{v}_{j,\alpha} = \ell_{\lfloor S\alpha \rfloor}$ is the empirical α quantile of the sample $\ell_{j,1}, \ell_{j,2}, \ldots, \ell_{j,S}$. Assertion (24) is then equivalent to

$$\sqrt{S}(\widehat{\text{CVaR}}_j - \text{CVaR}_j) = \frac{1}{\sqrt{S}(1-\alpha)} \sum_{t=1}^{S} \left\{(\ell_{j,t} - v_{j,\alpha})^+ - E(\ell_{j,t} - v_{j,\alpha})^+\right\} + o_P(1). \quad (25)$$

To establish (25), we follow Kolla, Prashanth, P. Bhat, and Jagannathan (2019) and write $\widehat{\text{CVaR}}_j$ as

$$\begin{aligned}
\widehat{\text{CVaR}}_j &= \widehat{v}_{j,\alpha} + \frac{1}{S(1-\alpha)} \sum_{t=1}^{S} (\ell_{j,t} - \widehat{v}_{j,\alpha})\mathbb{1}(\ell_{j,t} \geq \widehat{v}_{j,\alpha}) \\
&= v_{j,\alpha} + \frac{1}{S(1-\alpha)} \sum_{t=1}^{S} (\ell_{j,t} - v_{j,\alpha})\mathbb{1}(\ell_{j,t} \geq v_{j,\alpha}) + e_S \\
&= \text{CVaR}_j + \frac{1}{S(1-\alpha)} \sum_{t=1}^{S} \Big\{(\ell_{j,t} - v_{j,\alpha})\mathbb{1}(\ell_{j,t} \geq v_{j,\alpha}) \\
&\qquad - E(\ell_{j,t} - v_{j,\alpha})\mathbb{1}(\ell_{j,t} \geq v_{j,\alpha})\Big\} + e_S,
\end{aligned}$$

where

$$\begin{aligned}
e_S = &\frac{\widehat{v}_{j,\alpha} - v_{j,\alpha}}{1-\alpha}\left(\widehat{F}_{j,S}(\widehat{v}_{j,\alpha}) - \alpha\right) \\
&+ \frac{1}{S(1-\alpha)} \sum_{t=1}^{S} (\ell_{j,t} - v_{j,\alpha})\left[\mathbb{1}(\ell_{j,t} \geq \widehat{v}_{j,\alpha}) - \mathbb{1}(\ell_{j,t} \geq v_{j,\alpha})\right]
\end{aligned}$$

and $\widehat{F}_{j,S}$ denotes the empirical distribution function of $\ell_{j,t}$, $t = 1, 2, \ldots, S$. From the above derivations we get

$$\sqrt{S}(\widehat{\text{CVaR}}_j - \text{CVaR}_j) = \frac{1}{\sqrt{S}(1-\alpha)} \sum_{t=1}^{S} \Big\{ (\ell_{j,t} - v_{j,\alpha})^+ - E(\ell_{j,t} - v_{j,\alpha})^+ \Big\} + \sqrt{S} e_S,$$

and in order to establish (25) it suffices to show that $\sqrt{S} e_S = o_P(1)$. For this verify first that

$$\begin{aligned} \Big| \frac{1}{S(1-\alpha)} \sum_{t=1}^{S} (\ell_{j,t} - v_{j,\alpha}) \big[\mathbb{1}(\ell_{j,t} \geq \widehat{v}_{j,\alpha}) - \mathbb{1}(\ell_{j,t} \geq v_{j,\alpha}) \big] \Big| & \\ \leq \frac{|\widehat{v}_{j,\alpha} - v_{j,\alpha}|}{1-\alpha} \big| \widehat{F}_{j,n}(\widehat{v}_{j,\alpha}) - \widehat{F}_{j,n}(v_{j,\alpha}) \big|, & \end{aligned}$$

and therefore,

$$\begin{aligned} |\sqrt{S} e_S| \leq & \frac{|\sqrt{S}(\widehat{v}_{j,\alpha} - v_{j,\alpha})|}{1-\alpha} \big| \widehat{F}_{j,S}(\widehat{v}_{j,\alpha}) - \alpha \big| \\ & + \frac{|\sqrt{S}(\widehat{v}_{j,\alpha} - v_{j,\alpha})|}{1-\alpha} \big| \widehat{F}_{j,n}(\widehat{v}_{j,\alpha}) - \widehat{F}_{j,n}(v_{j,\alpha}) \big|. \end{aligned} \tag{26}$$

Notice that under Assumption (ii), $\sqrt{S}(\widehat{v}_{j,\alpha} - v_{j,\alpha}) = O_P(1)$, that is, $\widehat{v}_{j,\alpha} \xrightarrow{P} v_{j,\alpha}$; see Lemma 5.1 of Sun and Lahiri (2006). Furthermore,

$$\begin{aligned} |\widehat{F}_{j,S}(\widehat{v}_{j,\alpha}) - \alpha| &\leq |\widehat{F}_{j,S}(\widehat{v}_{j,\alpha}) - F_j(\widehat{v}_{j,\alpha})| + |\widehat{F}_j(\widehat{v}_{j,\alpha}) - \alpha| \\ &\leq \sup_{x \in \Re} |\widehat{F}_{j,S}(x) - F_j(x)| + |\widehat{F}_j(\widehat{v}_{j,\alpha}) - \alpha|. \end{aligned}$$

Since $\sup_{x \in \Re} |\widehat{F}_{j,S}(x) - F_j(x)| \xrightarrow{P} 0$, see Dehling and Philipp (2002), the first term, goes to zero in probability. For the second term observe that $\widehat{v}_{j,\alpha} \xrightarrow{P} v_{j,\alpha}$ implies by the continuity of F_j that $|\widehat{F}_j(\widehat{v}_{j,\alpha}) - \alpha| \xrightarrow{P} 0$. Thus the first term on the right hand side of the bound given in (26) converges to zero in probability as $S \to \infty$. For the second term of the same bound, we have

$$\begin{aligned} \big| \widehat{F}_{j,n}(\widehat{v}_{j,\alpha}) - \widehat{F}_{j,n}(v_{j,\alpha}) \big| &\leq \big| \widehat{F}_{j,n}(\widehat{v}_{j,\alpha}) - F_{j,n}(\widehat{v}_{j,\alpha}) \big| + \big| \widehat{F}_{j,n}(v_{j,\alpha}) - F_{j,n}(v_{j,\alpha}) \big| \\ &\quad + \big| F_j(\widehat{v}_{j,\alpha}) - F_j(v_{j,\alpha}) \big| \\ &\leq 2 \sup_{x \in \Re} \big| \widehat{F}_{j,n}(x) - F_{j,n}(x) \big| + \big| F_j(\widehat{v}_{j,\alpha}) - F_j(v_{j,\alpha}) \big|, \end{aligned}$$

which converges to zero in probability as $S \to \infty$, again, by the uniform consistency of $\widehat{F}_{j,S}$ as an estimator of F_j, the fact that $\widehat{v}_{j,\alpha} \xrightarrow{P} v_{j,\alpha}$ and the continuity of the distribution function F_j.

The previous derivations have shown that $\sqrt{S} e_S = o_P(1)$ and therefore that (25) holds true from which we conclude the proof of assertion (23). According to this assertion, the limiting distribution of $\sqrt{S}(\widetilde{Y}_S - \mu)$ is the same as the limiting distribution of $\sqrt{S}(\overline{Y}_S - \mu)$. To establish the limiting distribution of the last mentioned sequence, we get from Assumption (i), that, as $S \to \infty$,

$$\sqrt{S}(\overline{Y}_S - \mu) \xrightarrow{d} \mathcal{N}(0, \Sigma_r), \tag{27}$$

where

$$\Sigma_r = \sum_{h=-\infty}^{\infty} \mathrm{E}\big((R_t - \mathrm{E}(R_t))(R_{t+h} - \mathrm{E}(R_{t+h}))^\top\big).$$

To proceed with the limiting distribution of the test statistic T_S, observe first that $T_S = g(\overline{Y}_S)$, where the function $g : \Re^4 \to \Re$ is defined by $g(x_1, x_2, x_3, x_4) = x_1/x_2 - x_3/x_4$ for $x_2 \neq 0$ and $x_4 \neq 0$. In view of (27) and the fact that

$$\frac{\partial}{\partial x} g(x)\big|_{x=\mu} = \big(\frac{1}{\mathrm{CVaR}_1}, -\frac{MtC_1}{\mathrm{CVaR}_1}, -\frac{1}{\mathrm{CVaR}_0}, \frac{MtC_0}{\mathrm{CVaR}_0}\big)^\top \neq 0,$$

we get by an application of the delta method, see (Brockwell and Davis, 1991, Proposition 6.4.2), that

$$\sqrt{S}\big(T_S - (MtC_1^* - MtC_0^*)\big) \xrightarrow{d} \mathcal{N}(0, (\frac{\partial}{\partial x} g(x)\big|_{x=\mu})^\top \Sigma_r \frac{\partial}{\partial x} g(x)\big|_{x=\mu}). \tag{28}$$

The assertion of the theorem follows since under the null hypothesis, $MtC_1^* = MtC_0^*$.

B Inference test algorithm

To implement the testing procedure of Theorem 2.2 requires an estimation of the covariance matrix Σ_r of τ_0^2. The following block bootstrapping algorithm estimates Σ_r and, consequently, implement the inference test.

Inference test algorithm

Step 1: Select a block size $b \in \mathbb{N}$, $b < S$ and let $k = \lceil S/b \rceil$. Assume for simplicity that S/b is an integer. Denote by $B_{t,b} = \{(r_{1,t+s-1}, r_{0,t+s-1}), s = 1, 2, \ldots, b\}$ the block of b consecutive observations having starting point t, where $t \in \{1, 2, \ldots, S - b + 1\}$.

Step 2: Select randomly (i.e., with replacement), k such blocks $B_{t,b}$ from the set of all possible $S - b + 1$ blocks and join them together in the order selected to form a bivariate set of pseudo observations denoted by $(r^*_{1,t}, r^*_{0,t})$, $t = 1, 2, \ldots, S$.

Step 3: Calculate $\overline{Y}^*_S = \frac{1}{S}\sum_{t=1}^{S} R^*_t$, where

$$R^*_t = \Big(r^*_{1,t}, -\frac{1}{(1-\alpha)}\, r^*_{1,t} \cdot \mathbb{1}(r^*_{1,t} \leq \widehat{\zeta}^*_{1,1-\alpha}),\ r^*_{0,t},\ -\frac{1}{(1-\alpha)} r^*_{0,t} \cdot \mathbb{1}(r^*_{0,t} \leq \widehat{\zeta}^*_{0,1-\alpha})\Big)^\top.$$

Step 4: Repeat Step 2 and 3 a large number of times, say B times, and denote by $\overline{Y}^*_{S,i}$, $i = 1, 2, \ldots, B$, the replications of $\overline{Y}^*_S$ obtained by these repetitions. Calculate

$$\Sigma^*_r = \frac{1}{B}\sum_{i=1}^{B}\big(\overline{Y}^*_{S,i} - \overline{M}_B\big)\cdot\big(\overline{Y}^*_{S,i} - \overline{M}_B\big)^\top, \text{ where } \overline{M}_B = \frac{1}{B}\sum_{i+1}^{B}\overline{Y}^*_{S,i}.$$

Step 5: Let $\widehat{\tau}_0^2 = S \cdot \widehat{\underline{c}}^\top \Sigma^*_r\, \widehat{\underline{c}}$, where

$$\widehat{\underline{c}} = \Big(\frac{1}{\widehat{\mathrm{CVaR}}_1}, -\frac{\widehat{\mathrm{MtC}}}{\widehat{\mathrm{CVaR}}_1}, -\frac{1}{\widehat{\mathrm{CVaR}}_0}, \frac{\widehat{\mathrm{MtC}}}{\widehat{\mathrm{CVaR}}_0}\Big),$$

and $\widehat{\mathrm{MtC}} = (\widehat{\mathrm{MtC}}_1 + \widehat{\mathrm{MtC}}_0)/2$.

Step 6: Reject the null hypothesis H_0 if $\sqrt{S}\cdot T_S \geq z_{1-\beta}$, where $z_{1-\beta}$ denotes the $(1-\beta)$ quantile of the $\mathcal{N}(0, \widehat{\tau}_0^2)$ distribution.

We can modify the algorithm to test the null hypothesis in (12). From Corollary 2.1 it follows that the null is rejected if $\sqrt{S}\cdot C_S \geq z_{1-\beta}$ with $z_{1-\beta}$ the upper $(1-\beta)$ percentage point of the $\mathcal{N}(0, \widehat{v}_0^2)$ distribution. Here $\widehat{v}_0^2 = S \cdot \underline{e}^\top \Sigma^*_r\, \underline{e}$, where Σ^*_r is the estimator obtained in Step 4 of the inference test algorithm.

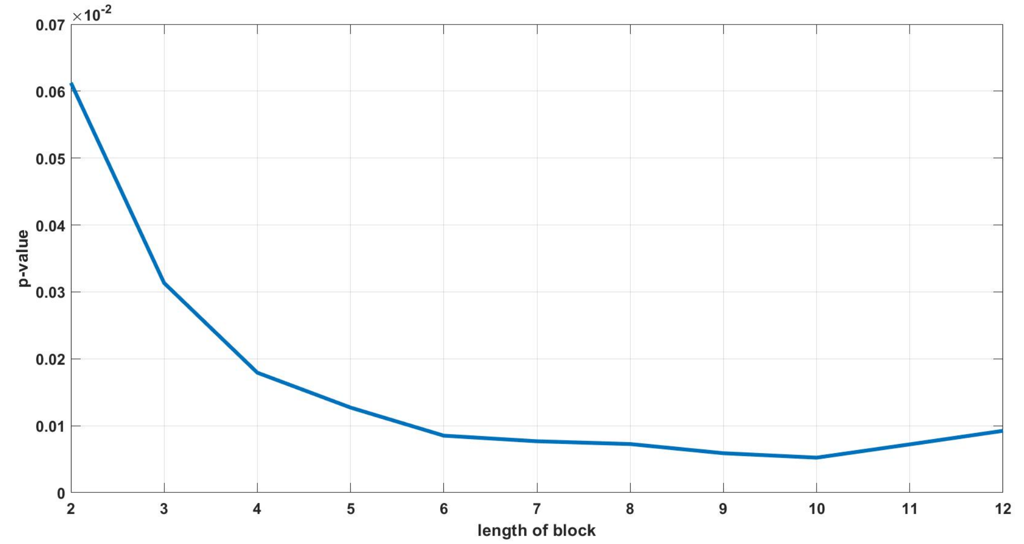
[Insert Figure B1 Near Here]

Figure B1 illustrates results with the inference test algorithm comparing the peak MtC tangency portfolio from Figure 1 with a local (US) index benchmark, for a sample size $S = 252$. Panel A shows the sensitivity of the algorithm with respect to the block sizes, and Panel B shows the p-values of the test. Bootstrapping with overlapping blocks is quite efficient and empirical evidence suggests that it works well for block sizes in the range $[S^{1/3}, S^{1/4}]$, i.e., 4 to 6 for our sample. As we observe the null is rejected in favour of the alternative, for all block sizes between 2 to 12. Panel B shows the behaviour of the test with respect to the number of bootstrap repetitions, and we observe that for different number of repetitions the estimates of the p-value differ at the fourth decimal point. In all tests we use block size $b = 6$ and $B = 5000$ repetitions.

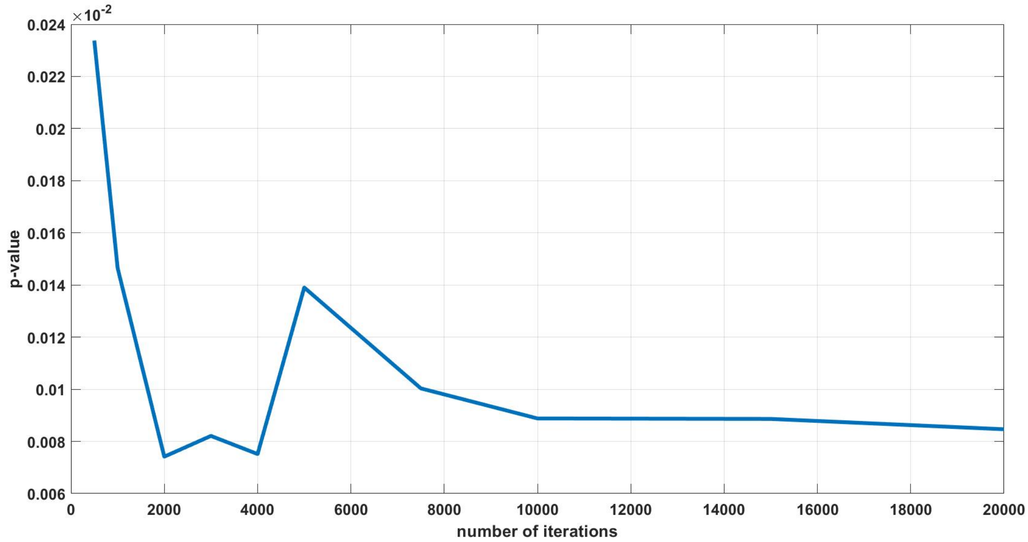
Figure B1 – Bootstrapped differences under the null hypothesis

This figure illustrates results with the inference test algorithm in comparing the MtC statistics of the MtC tangency portfolio from Figure 2 with the local (US) index benchmark, with a sample size $S = 252$. Panel A displays the sensitivity of he algorithm to varying overlapping block sizes. Panel B shows the convergence of the p-value estimates for different number of repetitions.

(a) Sensitivity for varying block size



(b) Convergence of p-value estimates



C Robustness Tests

Table C1 – The CVaR risk of long-horizon investors

This table reports the CVaR at different horizons of the MSCI home market index (I) with internationally diversified MtC optimal politically unconstrained (U) and hedged (H) portfolios with net zero exposure to the P-factor. The horizons range from 1 to 120 months, and for inter-temporal comparison we standardize the CVaR. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	1	3	6	12	20	40	60	80	120
					(a) US				
H - I	0.014	0.022	0.026	0.042	-0.018	-0.212*	-0.375*	-0.559*	-1.200*
	(0.18)	(0.27)	(0.30)	(0.21)	(0.13)	(0.01)	(0.00)	(0.00)	(0.00)
H - U	-0.016*	-0.043*	-0.056*	-0.056*	-0.053*	-0.067	-0.327*	-0.363*	-0.616*
	(0.00)	(0.01)	(0.03)	(0.06)	(0.10)	(0.20)	(0.00)	(0.00)	(0.01)
U - I	0.030*	0.065*	0.082	0.098*	0.035	-0.145*	-0.048	-0.196*	-0.585*
	(0.04)	(0.09)	(0.12)	(0.09)	(0.19)	(0.03)	(0.20)	(0.02)	(0.02)
					(b) Eurozone				
H - I	-0.015*	-0.021	-0.017	-0.042*	-0.086*	-0.275*	-0.467*	-0.559*	-1.170*
	(0.09)	(0.21)	(0.24)	(0.08)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.001	-0.013	0.001	-0.030	-0.008	0.032	-0.111*	-0.343*	-0.513*
	(0.46)	(0.23)	(0.48)	(0.20)	(0.36)	(0.33)	(0.02)	(0.01)	(0.02)
U - I	-0.015	-0.008	-0.019	-0.012	-0.077*	-0.307*	-0.356*	-0.217*	-0.657*
	(0.14)	(0.41)	(0.35)	(0.36)	(0.06)	(0.00)	(0.00)	(0.00)	(0.00)
					(c) Japan				
H - I	0.024*	0.040	0.062	0.077*	-0.001	-0.272*	-0.352*	-0.749*	-1.204*
	(0.08)	(0.18)	(0.14)	(0.09)	(0.47)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.016*	-0.056*	-0.040	-0.084*	-0.081*	-0.098*	-0.147*	-0.438*	-0.705*
	(0.01)	(0.02)	(0.13)	(0.05)	(0.04)	(0.03)	(0.04)	(0.01)	(0.02)
U - I	0.040*	0.096*	0.102	0.161*	0.080*	-0.174*	-0.205*	-0.311*	-0.499*
	(0.03)	(0.07)	(0.12)	(0.07)	(0.08)	(0.00)	(0.01)	(0.01)	(0.00)

Table C2 – The worst case risk of long-horizon investors

This table reports the worst excess return at different horizons of the MSCI home market index (I) with internationally diversified MtC optimal politically unconstrained (U) and hedged (H) portfolios with net zero exposure to the P-factor, for horizons ranging from 1 to 120 months. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	1	3	6	12	20	40	60	80	120
					(a) US				
H - I	-0.115	-0.132	-0.092	-0.105	-0.001	0.153*	0.439*	0.555*	1.206*
	(0.26)	(0.22)	(0.20)	(0.16)	(0.39)	(0.02)	(0.00)	(0.00)	(0.00)
H - U	0.009*	0.024	0.062*	0.051*	0.065*	0.042	0.344*	0.469*	0.600*
	(0.09)	(0.13)	(0.04)	(0.09)	(0.05)	(0.15)	(0.00)	(0.00)	(0.01)
U - I	-0.124	-0.156	-0.154	-0.156	-0.066	0.112*	0.095	0.085	0.606*
	(0.24)	(0.20)	(0.19)	(0.20)	(0.28)	(0.04)	(0.13)	(0.15)	(0.01)
					(b) Eurozone				
H - I	-0.041	-0.046	-0.010	0.001	0.078*	0.267*	0.473*	0.557*	1.081*
	(0.29)	(0.33)	(0.32)	(0.25)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	0.018*	0.023*	0.052*	0.069*	0.051*	0.032	0.083*	0.305*	0.455*
	(0.03)	(0.07)	(0.10)	(0.08)	(0.02)	(0.23)	(0.03)	(0.03)	(0.02)
U - I	-0.059	-0.069	-0.062	-0.067	0.028	0.235*	0.390*	0.252*	0.625*
	(0.25)	(0.25)	(0.24)	(0.20)	(0.12)	(0.00)	(0.00)	(0.00)	(0.00)
					(c) Japan				
H - I	-0.141	-0.168	-0.161	-0.140	-0.030	0.176*	0.306*	0.722*	1.182*
	(0.25)	(0.21)	(0.18)	(0.15)	(0.31)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	0.020*	0.044*	0.085*	0.071	0.078*	0.093*	0.126*	0.421*	0.717*
	(0.03)	(0.08)	(0.04)	(0.12)	(0.07)	(0.03)	(0.06)	(0.01)	(0.01)
U - I	-0.161	-0.212	-0.246	-0.211	-0.107	0.083*	0.181*	0.301*	0.465*
	(0.25)	(0.20)	(0.21)	(0.15)	(0.23)	(0.02)	(0.02)	(0.01)	(0.00)

Table C3 – Hedging political and currency risk with short positions

This table reports performance statistics of the MSCI market indices and internationally diversified portfolios using equally weighted (EW) and mean-to-CVaR optimal portfolios, without hedging (U) and with political risk hedging (H). Currency risk is hedged using forward contracts and political risk is hedged with net zero exposure to the P-factor. We allow for short sales in developed markets, but no short sales in emerging markets. We also report the exposure of each portfolio to the global political risk factor (β_P), and the performance ratios MtC and Sharpe ratio. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	I	EW	U	H	U-H	U-I	H-I	U-EW	H-EW
				(a) US					
β_P	-0.01	0.08*	0.02	0.00	0.02	0.03	0.01	-0.06	-0.08
	(0.57)	(0.00)	(0.71)	(1.00)	(0.73)	(0.51)	(0.83)	(0.27)	(0.11)
Av. excess return	0.52	0.50	1.23	1.17	0.06	0.70	0.64	0.72	0.66
CVaR	9.90	9.95	6.43	6.16	0.27	-3.47	-3.74	-3.52	-3.79
MtC	0.053	0.051	0.191	0.189	0.001	0.138*	0.136*	0.140*	0.139*
					(0.42)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.12	0.12	0.31	0.31	0.00	0.19*	0.19*	0.19*	0.19*
					(0.79)	(0.01)	(0.01)	(0.01)	(0.01)
				(b) Eurozone					
β_P	0.04	0.08*	0.02	0.00	0.02	-0.02	-0.04	-0.06	-0.08
	(0.22)	(0.00)	(0.74)	(1.00)	(0.77)	(0.73)	(0.49)	(0.24)	(0.12)
Av. excess return	0.36	0.45	1.17	1.17	0.00	0.81	0.80	0.72	0.71
CVaR	12.16	10.06	6.49	6.52	-0.03	-5.67	-5.64	-3.57	-3.53
MtC	0.030	0.045	0.180	0.179	0.001	0.150*	0.149*	0.135*	0.134*
					(0.42)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.07	0.11	0.30	0.30	0.00	0.23*	0.23*	0.19*	0.19*
					(0.97)	(0.00)	(0.00)	(0.01)	(0.01)
				(c) Japan					
β_P	0.04	0.08*	0.02	0.00	0.02	-0.02	-0.04	-0.06	-0.08
	(0.40)	(0.00)	(0.78)	(1.00)	(0.80)	(0.73)	(0.54)	(0.25)	(0.12)
Av. excess return	0.47	0.46	1.22	1.14	0.08	0.75	0.68	0.76	0.69
CVaR	10.54	10.01	6.66	6.30	0.36	-3.88	-4.24	-3.35	-3.71
MtC	0.044	0.046	0.183	0.182	0.001	0.139*	0.138*	0.138*	0.136*
					(0.40)	(0.00)	(0.00)	(0.00)	(0.00)
Sharpe	0.09	0.11	0.30	0.30	0.00	0.21*	0.21*	0.19*	0.19*
					(0.82)	(0.01)	(0.01)	(0.01)	(0.01)

Table C4 – Long-horizon investors with short positions

This table reports the MtC performance measure at different horizons of the MSCI home market index (I) with internationally diversified MtC optimal politically unconstrained (U) and hedged portfolios with net zero exposure to the P-factor (H). The horizons range from 1 to 120 months, and for inter-temporal comparison we standardize the CVaR. We allow for short sales in developed markets, but no short sales in emerging markets. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019. p-values in parenthesis, and * corresponds to rejection of the null hypothesis at least at the 10% level.

	1	3	6	12	20	40	60	80	120
(a) US									
H - I	0.106*	0.167*	0.234*	0.335*	0.448*	0.741*	0.912*	1.091*	0.749*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.003	-0.005	0.000	0.019	0.009	-0.091	-0.103*	-0.063	-0.577*
	(0.40)	(0.39)	(0.49)	(0.18)	(0.31)	(0.13)	(0.05)	(0.32)	(0.01)
U - I	0.108*	0.171*	0.235*	0.315*	0.440*	0.832*	1.015*	1.154*	1.326*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(b) Eurozone									
H - I	0.163*	0.223*	0.313*	0.454*	0.567*	0.852*	1.162*	0.874*	1.002*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.009	0.007	-0.008	-0.020	-0.014	-0.018	-0.353*	-0.353*	-0.694*
	(0.34)	(0.40)	(0.42)	(0.35)	(0.39)	(0.28)	(0.00)	(0.03)	(0.01)
U - I	0.171*	0.216*	0.320*	0.474*	0.581*	0.871*	1.515*	1.227*	1.696*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
(c) Japan									
H - I	0.115*	0.152*	0.219*	0.342*	0.475*	0.842*	1.053*	1.050*	1.218*
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
H - U	-0.003	-0.006	-0.013	-0.033	-0.036	-0.056*	0.052	-0.029	-2*
	(0.33)	(0.28)	(0.23)	(0.12)	(0.18)	(0.07)	(0.33)	(0.42)	(0.02)
U - I	0.119*	0.158*	0.232*	0.375*	0.511*	0.898*	1.001*	1.079*	1.630*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

D Supplementary material

Figure D1 – Country loadings on the political risk factor

This figure illustrates the positive relationship between factor loadings on the P-factor and country average excess returns, per annum. Factor loadings are estimated from an asset pricing model that controls for market and political risks. The sample includes 22 developed economies and 20 emerging markets, spanning 1999–2019.