A Political Capital Asset Pricing Model

Giovanni Pagliardi [†] Patrice Poncet [‡] Stavros Zenios [⋆]

[†] BI Norwegian Business School, Oslo

[‡]ESSEC Business School, Paris

[⋆]University of Cyprus, Wharton Financial Institutions Center, Bruegel

April 5, 2019 - AMF

Overview

1. Motivation: Pricing politics and policy in international stock markets

2. A new bivariate political risk factor (P-factor)
   - P-factor construction
   - Risk premium commanded by the P-factor
   - P-factor validation

3. A Political Capital Asset Pricing Model (P-CAPM)
   - Theoretical macroeconomic foundations
   - Model testing

4. Explanation of "political risk sign paradox" and conclusions

Introduction

Point of departure: *Political cycles affect stock returns*

Santa Clara & Valkanov (RFS 2003) - Julio & Yook (JFE 2012) - Pastor & Veronesi (JF 2012, JFE 2013) - Belo, Gala & Li (JFE 2013) - Broogard & Detzel (MS 2015) - Kelly, Pastor & Veronesi (JF 2016) - Baker, Bloom & Davis (QJE 2016)...

State of asset pricing literature: *What others have done*

Current asset pricing models incorporate the world price of covariance risk (Harvey, JF 1991), exchange rate risk (Adler & Dumas, JF 1993), labor market tightness (Kuehn et al, JF 2017), liquidity risk (Liu, JFE 2006)

Contribution: *What we do*

- We incorporate politics and policy in a new bivariate risk factor
- We incorporate the new risk factor in a novel asset pricing model

Theoretical framework

Douglass C. North (1991)'s theory on **institutions**

"The **rules** *of the game in a society, or, more formally, the humanly devised constraints that shape human interactions"*

Distinction between **political rules** and **economic rules**

1. **Political rules:** type of government, electoral rules, government stability, property rights enforcement, rule of law, efficiency of the legal system...
2. **Economic rules:** fiscal policies, government spending, taxation...

Empirical facts

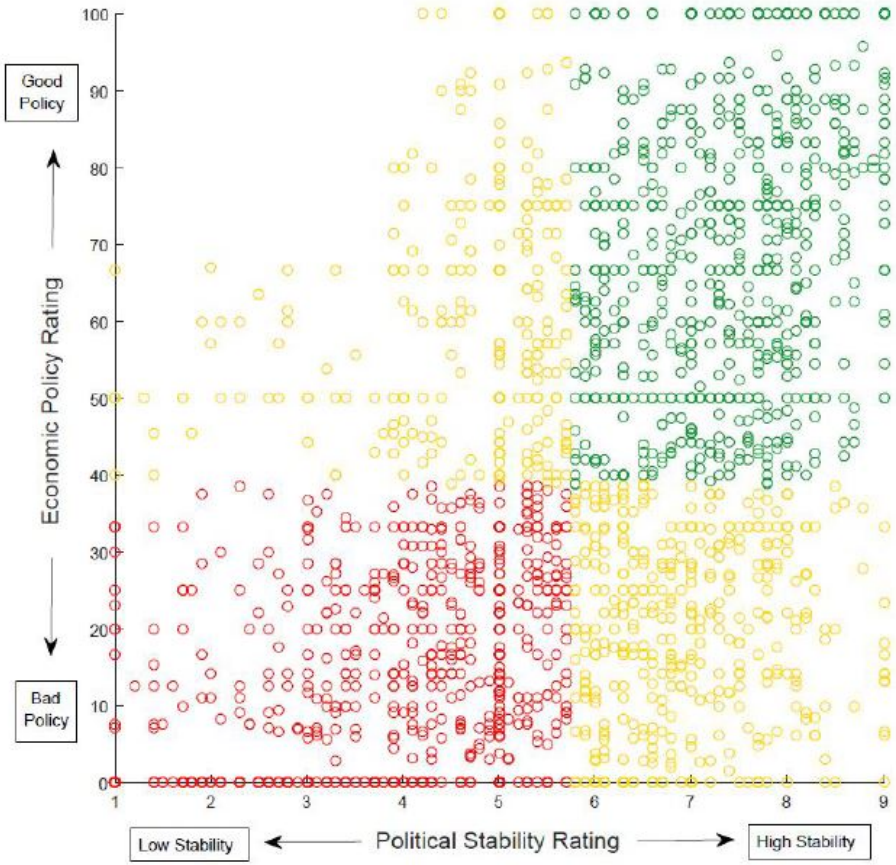
Politics and policy do not necessarily move in tandem

1. Moderate cross-sectional, time-series and rank correlation
2. Real-life examples:
   - **China**: stable politics, changing policies
   - **Greece**: unstable politics, stable policies

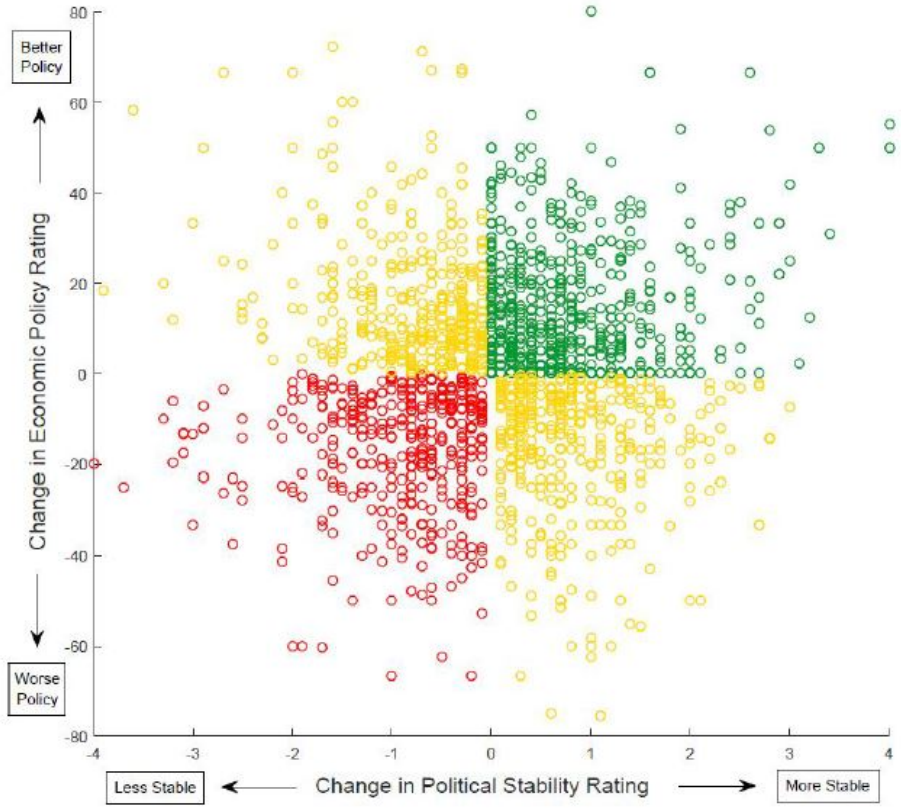
Both politics and policy have significant economic impact

1. Distinction between *Institutions* and *Policies*
   - "A tale of two islands" (Henry & Miller, AER *P&P*, 2009)
   - Opposite examples: West vs East Germany, North vs South Korea
2. Economic growth and asset prices are affected by both political stability (Alesina et al. (1996), Barro (1991)) and economic policy uncertainty (Pastor & Veronesi (2012), Broogard & Detzel (2015))
3. Politics and policy have significant and differential impact on international stock market returns (Gala, Pagliardi, Zenios (2018))

Key empirical result



(a) Rating scores.



(b) Changes in rating scores.

This paper in a nutshell

Contribution

1. Introduce a novel dataset to overcome the measurement problem (North (1993)) - IFO WES data
2. Create and price a new political risk factor (P-factor)
3. Develop theoretically and test a new asset pricing model (P-CAPM)

Main results

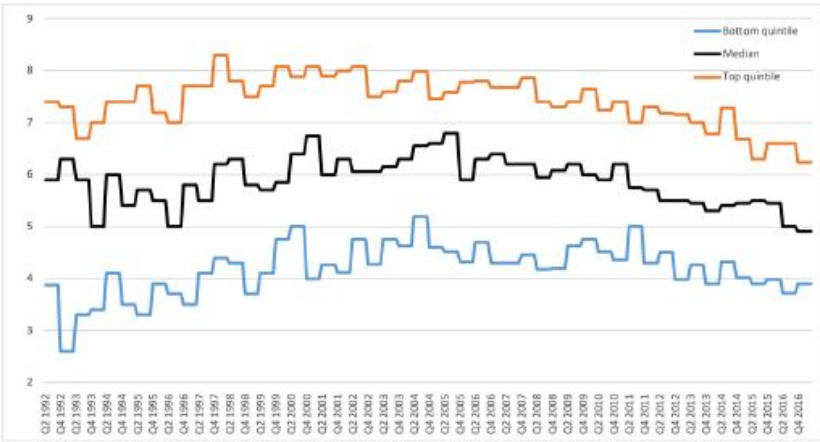
1. P-factor is not spanned by prominent benchmarks
2. P-factor is priced in developed, emerging and frontier stock markets
3. P-CAPM has *i)* higher cross-sectional R^2, *ii)* lower MAPE, and *iii)* better predictive power than all existing models
4. Our bivariate P-factor has better performance than the univariate alternative based on ICRG

Novel measures of politics and policy

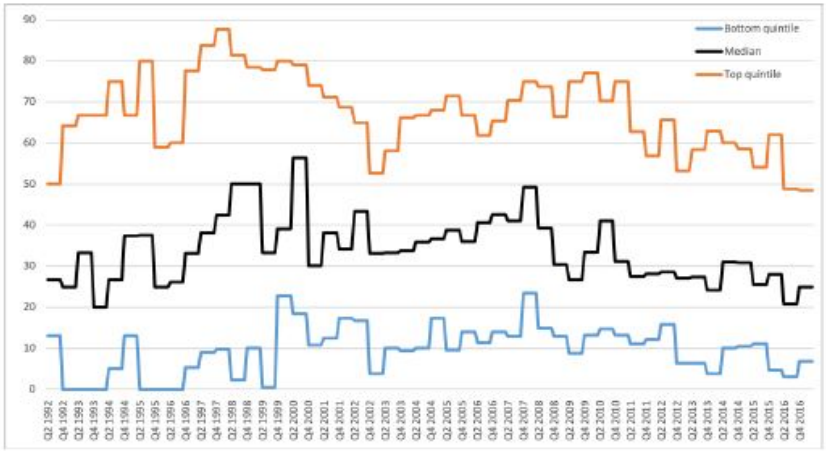
- **Data**: Country ratings coming from experts' evaluations
- **Source**: "World Economic Survey", IFO Research Center - Germany
  - *"Assess the importance of the following factors which influence the climate for foreign investors in this country: political instability is absent, low or high."*
  - *"Is the economy of your country currently facing the following problems? Lack of confidence in the government's economic policy."*
- **Period**: 1992-2016
- **Frequency**: Semi-annual
- **Sample in our analysis**: 42 countries, developed and emerging
- More: descriptive statistics of politics and policy ratings

The state variables of the P-factor

(a) Political stability



(b) Economic policy confidence



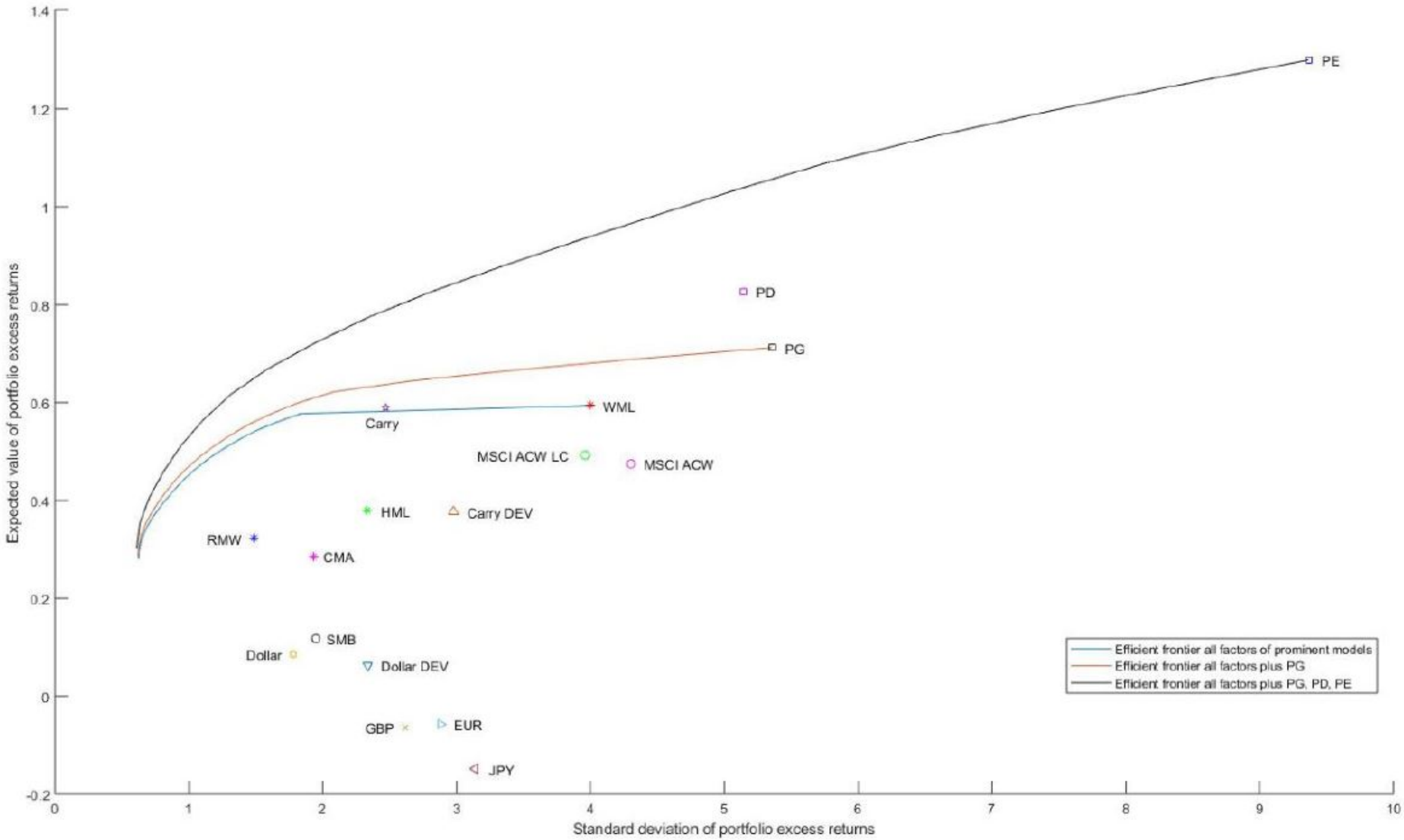
(c) Summary statistics

	Global	Developed	Emerging
Politics (Mean)	5.71	6.73	4.59
Politics (StDev)	1.29	1.17	1.42
Policy (Mean)	38.59	46.09	30.34
Policy (StDev)	23.97	25.23	22.58
Intertemporal corr. politics-policy	0.43	0.39	0.46
Cross-sectional corr. politics-policy	0.54	0.48	0.49
Kendall τ politics-policy	0.40	0.34	0.37

P-factor construction

- **Bivariate** factor mimicking portfolio of politics and policy variables
- Long-short factor based on **unconditional** country sorts
  - **Long leg**: USD returns of an equally-weighted portfolio of low-rated politics/policy countries (bottom quantiles)
  - **Short leg**: USD returns of an equally-weighted portfolio of highly-rated politics/policy countries (top quantiles)
- Portfolio rebalanced every 3 months at each new WES data release
- We construct a P-factor for global markets (**PG**), developed (**PD**) and emerging (**PE**) countries

Efficient frontier of the factors



P-factors statistics

	Correlation				
	PG	PD	PE	MKT	MKTLC
PG					
PD	0.29				
PE	0.59	-0.04			
MKT	0.12	0.03	0.13		
MKTLC	0.15	0.04	0.13	0.95	
Mean	8.54%	-9.92%	15.60%	5.88%	5.62%
StDev	18.55%	17.81%	32.43%	14.71%	13.64%
p-value	0.047	0.004	0.028	0.079	0.072
Sharpe	0.46	-0.56	0.48	0.40	0.41

Risk premium on the P-factor: Methodology

- **2-step procedure**
  - N time-series regressions to estimate factor loadings

$$r_{i,t} - r_t^f = \alpha_i + \beta_{1,i} f_{1,t} + \beta_{2,i} f_{2,t} \ldots + \beta_{K,i} f_{K,t} + \epsilon_{i,t}$$

  - OLS cross-sectional regression of average returns on factor loadings

$$\mathbb{E}(r_i) = \lambda_1 \beta_{1,i} + \lambda_2 \beta_{2,i} \ldots + \lambda_K \beta_{K,i} + \eta_i$$

- **We add the P-factor to the factors of each benchmark model**

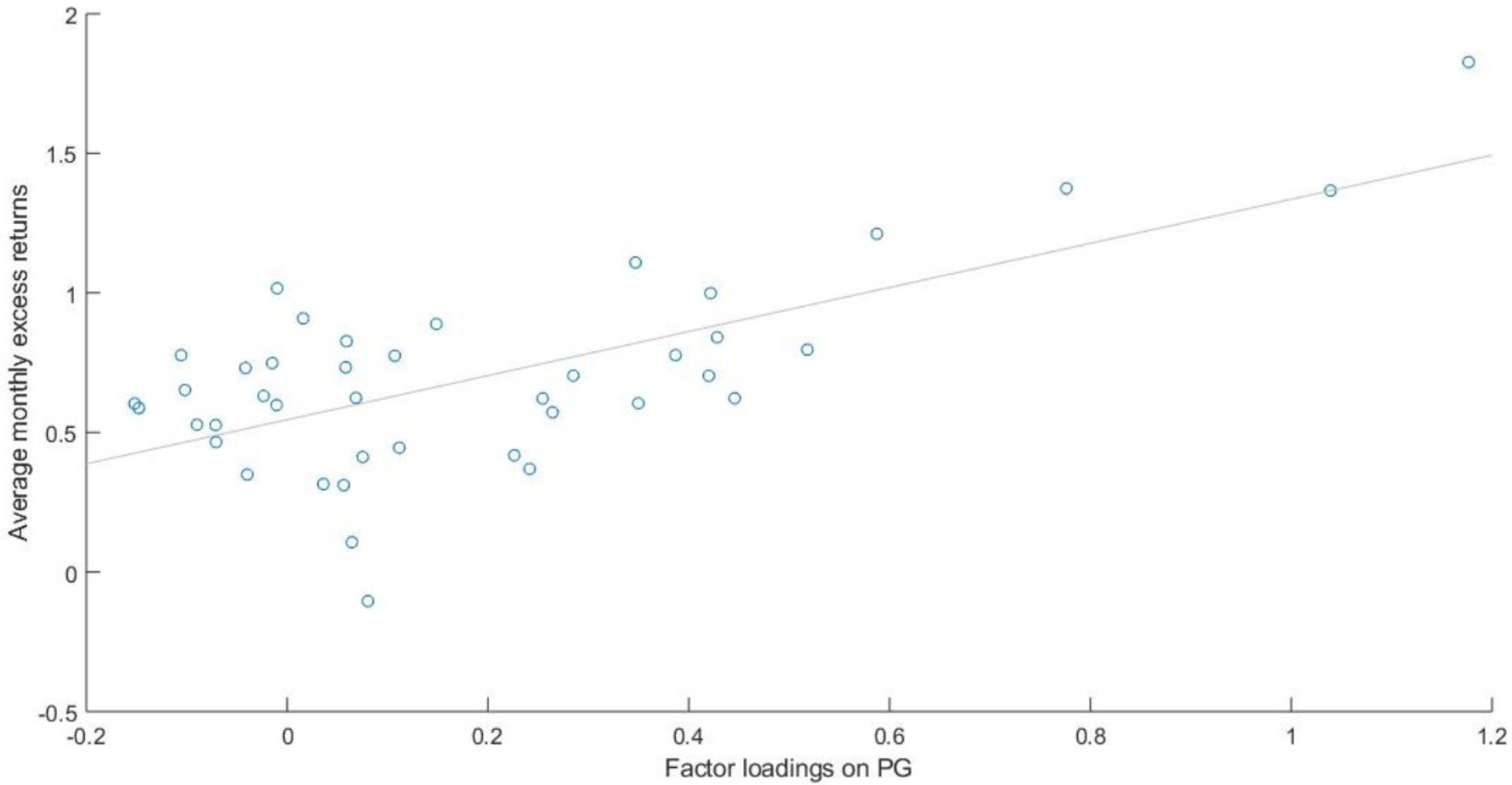
Risk premium on the P-factor: Results

- Global markets
  - Risk premium on PG $\approx 8\%$ p.a.
  - $\Delta R^2_{Adj} \in [16\%, 24\%]$
  - Average ΔMAPE $= -0.4\%$ p.a.
- Developed markets
  - Risk premium on PD $\approx -11\%$ p.a.
  - $\Delta R^2_{Adj} \in [8\%, 42\%]$
  - Average ΔMAPE $= -0.3\%$ p.a.
- Emerging markets
  - Risk premium on PE $\approx 15\%$ p.a.
  - $\Delta R^2_{Adj} \in [21\%, 29\%]$
  - Average ΔMAPE $= -0.7\%$ p.a.

Improvement in cross-sectional adjusted R^2 with P-factor

	World CAPM	Intl 3-factor Fama-French	Intl Carhart	Intl 5-factor Fama-French	Intl CAPM	Intl CAPM Redux	Single P-factor
Panel A. Global Markets							
R^2_{Adj}	0.28	0.32	0.35	0.41	0.35	0.32	0.50
R^2_{Adj} adding PG	0.52	0.53	0.59	0.57	0.52	0.52	
Panel B. Developed Markets							
R^2_{Adj}	0.00	0.10	0.18	0.26	0.21	0.14	0.36
R^2_{Adj} adding PD	0.38	0.37	0.44	0.34	0.53	0.51	
Panel C. Emerging Markets							
R^2_{Adj}	0.47	0.50	0.51	0.52	0.50	0.52	0.66
R^2_{Adj} adding PE	0.69	0.79	0.78	0.81	0.71	0.75	

Loadings on PG vs Average global markets returns



More: Loadings on PD, Developed and Loadings on PE, Emerging

P-factor validation

- Beta-sorted portfolios
  - Sorts based on state variables and P-factor exposures are clearly related
- Spanning regressions
  - Neither PG nor PD nor PE are spanned by existing factors
- PCA
  - It takes 11 out of 12 factors to explain 99% of variability of all factors
- Alternative potential factors based on Douglass North's classification
  - P-factor explains other factors based on alternative political variables

Model setup (1)

- Firms' production function:

$$Y_{i,t} = \exp\left[x_{w,t} + z_{i,t} + f_{i,t} + g_{i,t} + \pi_i p_{w,t} + \mu_i e_{w,t}\right] (K_{i,t})^{\kappa} \quad (1)$$

- Physical capital obeys the law of motion

$$K_{i,t+1} = (1 - d_i) K_{i,t} + I_{i,t} \quad (2)$$

- Distributed dividends in absence of retained earnings write

$$D_{i,t} = Y_{i,t} - I_{i,t} \quad (3)$$

Model setup (2)

- Country-specific and global political and policy shocks follow autoregressive dynamics

$$h_{k,t} = \rho_{h_k} h_{k,t-1} + \tilde{h}_t^k \tag{4}$$

$$\tilde{h}_t^k = \begin{cases} 0 & \text{with probability } 1 - b_k \\ \nu_t^k & \text{with probability } b_k \end{cases} \tag{5}$$

- Changes in policy and stability ratings are captured by a Laplace distribution

$$f(x) = \text{Prob}\left[\nu_t^k \in [x; x + dx]\right] / dx = \frac{1}{2}\alpha_k \exp\left[-\alpha_k |x|\right] \tag{6}$$

Firms' and consumers' optimization problems

- The firm maximizes market value of equity by choosing its investment policy to solve the following Bellman equation

$$V_{i,t} = \max_{I_{i,t}} \left[D_{i,t} + \mathbb{E}_t \left[M_{i,t+1} V_{i,t+1} \right] \right] \tag{7}$$

- The representative consumer of country i optimizes the Epstein-Zin lifetime utility of consumption

$$U_{i,t} = \left((1 - \delta_i) C_{i,t}^{1 - \frac{1}{\varphi_i}} + \delta_i \left\{ \mathbb{E}_t \left[U_{i,t+1}^{1-\gamma_i} \right] \right\}^{\frac{1}{\phi_i}} \right)^{\frac{1}{1 - \frac{1}{\varphi_i}}} \tag{8}$$

SDF and innovations in exchange rates

- Following Berk et al (1999), Backus et al (2001) and Yogo (2006), we assume that the SDF is exponentially affine

$$m_{i,t+1} = A_i - \lambda_i^{x_w} u_{t+1}^{x_w} - \lambda_i^{z_i} u_{t+1}^{z_i} - \lambda_i^{f_i} \hat{f}_{t+1}^{i} - \lambda_i^{g_i} \hat{g}_{t+1}^{i} - \lambda_i^{p_w} \hat{p}_{t+1}^{w} - \lambda_i^{e_w} \hat{e}_{t+1}^{w} \tag{9}$$

- Innovations in exchange rates log changes thus write

$$\begin{aligned} \Delta s_{t+1}^{i} - \mathbb{E}_t[\Delta s_{t+1}^{i}] &= (\lambda_i^{x_w} - \lambda^{x_w}) u_{t+1}^{x_w} + (\lambda_i^{z_i} u_{t+1}^{z_i} - \lambda^{z} u_{t+1}^{z}) \\ &+ (\lambda_i^{f_i} \hat{f}_{t+1}^{i} - \lambda^{f} \hat{f}_{t+1}) + (\lambda_i^{g_i} \hat{g}_{t+1}^{i} - \lambda^{g} \hat{g}_{t+1}) + (\lambda_i^{p_w} - \lambda^{p_w}) \hat{p}_{t+1}^{w} \\ &+ (\lambda_i^{e_w} - \lambda^{e_w}) \hat{e}_{t+1}^{w} \end{aligned} \tag{10}$$

From dividend growth process to USD return innovations

- Dividend growth process

$$\Delta d_{i,t+1} = \log\left(\frac{D_{i,t+1}}{D_{i,t}}\right) = \mu_{di} + \sigma_{di}^{x_w}\, u_{t+1}^{x_w} + \sigma_{di}^{z_i}\, u_{t+1}^{z_i} + \sigma_{di}^{f_i}\, \hat{f}_{t+1}^{i} + \sigma_{di}^{g_i}\, \hat{g}_{t+1}^{i} + \sigma_{di}^{p_w}\, \hat{p}_{t+1}^{w} + \sigma_{di}^{e_w}\, \hat{e}_{t+1}^{w} \quad (11)$$

- Euler equation for asset i

$$V_{i,t} = \mathbb{E}_t\left[M_{i,t+1}\left(V_{i,t+1} + D_{i,t+1}\right)\right] \quad (12)$$

- Log gross return innovations on asset i in USD

$$r_{i,t+1}^{\$} - \mathbb{E}_t\left[r_{i,t+1}^{\$}\right] = \gamma_i^{x_w}\, u_{t+1}^{x_w} + \gamma_i^{z_i}\, u_{t+1}^{z_i} + \gamma^{z}\, u_{t+1}^{z} + \gamma_i^{f_i}\, \hat{f}_{t+1}^{i} + \gamma^{f}\, \hat{f}_{t+1} + \gamma_i^{g_i}\, \hat{g}_{t+1}^{i} + \gamma^{g}\, \hat{g}_{t+1} + \gamma_i^{p_w}\, \hat{p}_{t+1}^{w} + \gamma_i^{e_w}\, \hat{e}_{t+1}^{w} \quad (13)$$

Common factors

- **Market portfolio innovations**

$$\text{MKT}_{t+1} - \mathbb{E}_t\left[\text{MKT}_{t+1}\right] = \bar{\gamma}^{x_w} u^{x_w}_{t+1} + \bar{\gamma}^{p_w} \hat{p}^{w}_{t+1} + \bar{\gamma}^{e_w} \hat{e}^{w}_{t+1} \tag{14}$$

- **Dollar factor**

$$\text{Dollar}_{t+1} = \frac{1}{L} \sum_{i=1}^{L} \left[r^{f}_{i,t} - r^{f}_{t} - \Delta s^{i}_{t+1} \right] \tag{15}$$

- **Dollar factor innovations**

$$\text{Dollar}_{t+1} - \mathbb{E}_t\left[\text{Dollar}_{t+1}\right] = \bar{\lambda}^{x_w} u^{x_w}_{t+1} + \bar{\lambda}^{p_w} \hat{p}^{w}_{t+1} + \bar{\lambda}^{e_w} \hat{e}^{w}_{t+1} \tag{16}$$

- **P-factor**

$$\text{P-factor}_{t+1} = \frac{1}{N_L} \sum_{i_L=1}^{N_L} r^{\$}_{i_L,t+1} - \frac{1}{N_H} \sum_{i_S=1}^{N_H} r^{\$}_{i_S,t+1} \tag{17}$$

- **P-factor innovations**

$$\text{P-factor}_{t+1} - \mathbb{E}_t\left[\text{P-factor}_{t+1}\right] = \bar{\theta}^{x_w} u^{x_w}_{t+1} + \bar{\theta}^{p_w} \hat{p}^{w}_{t+1} + \bar{\theta}^{e_w} \hat{e}^{w}_{t+1} \tag{18}$$

The P-CAPM

- Given the Euler equation relative to risky asset i, and after standard log-linear approximation to the pricing kernel, the USD excess return on asset i writes

$$\mathbb{E}_t \left[r^{\$}_{i,t+1} - r^{f}_{t+1} \right] = -\text{cov} \left[r^{\$}_{i,t+1}, m_{t+1} \right] =$$

$$= \text{cov} \left[r^{\$}_{i,t+1}, \lambda^{x_w} u^{x_w}_{t+1} + \lambda^{p_w} \hat{p}^{w}_{t+1} + \lambda^{e_w} \hat{e}^{w}_{t+1} \right] \quad (19)$$

- Our three-factor reduced form model writes

$$\text{E}_t \left[r^{\$}_{i,t+1} \right] - r^{f}_{t+1} = \beta_{Mi} \mathbb{E}_t \left[\text{MKT}_{t+1} \right] + \beta_{Di} \mathbb{E}_t \left[\text{Dollar}_{t+1} \right] + \beta_{Pi} \mathbb{E}_t \left[\text{Pfactor}_{t+1} \right] \quad (20)$$

Time-series test: GRS horse-race

- Percentage of 10-year rolling window tests rejecting the null that pricing errors are jointly zero for all assets

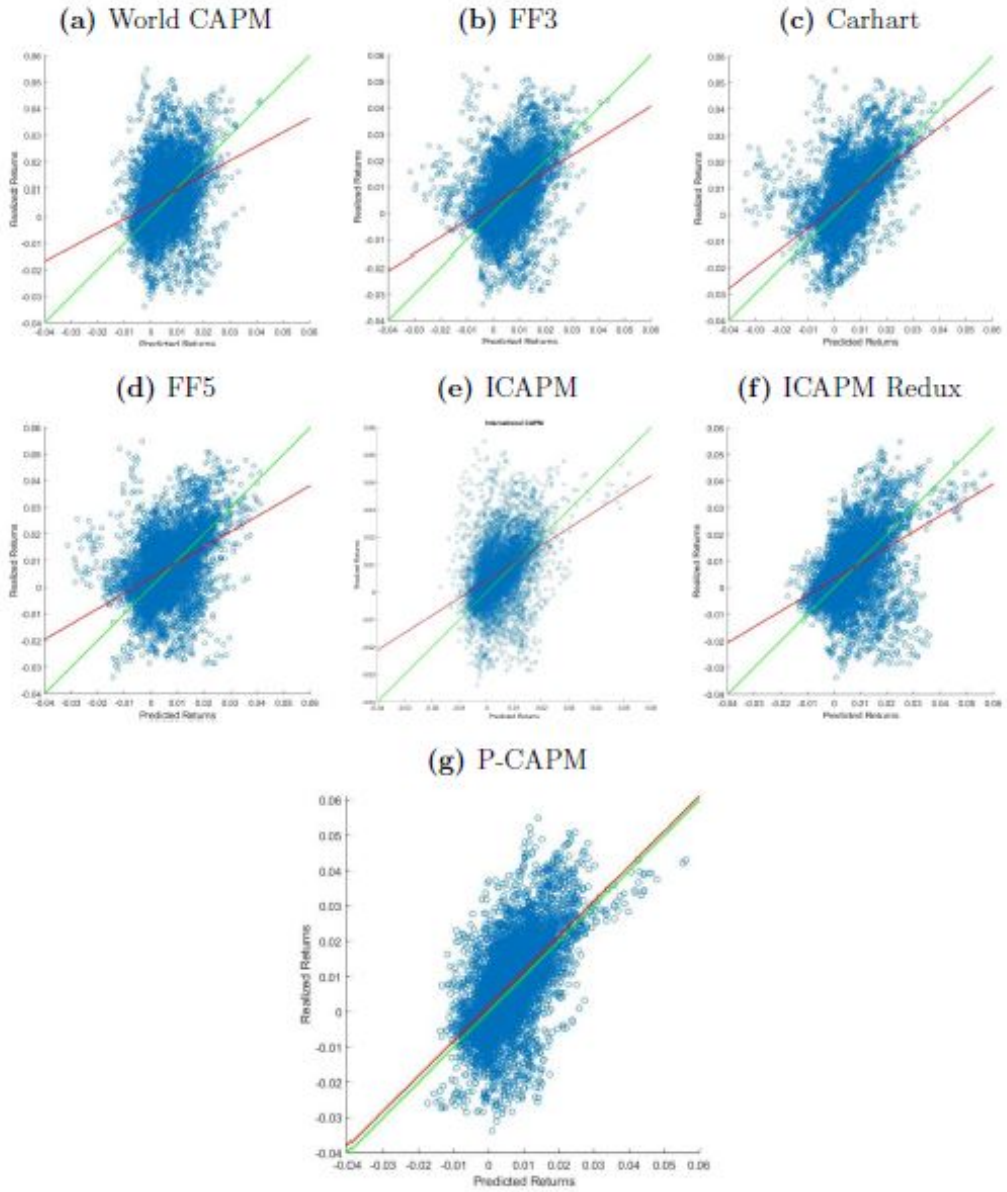
	Global	Developed	Emerging
World CAPM	7.82%	0.00%	6.70%
FF3	30.17%	3.35%	11.73%
Carhart	20.67%	1.12%	8.94%
FF5	18.44%	0.00%	15.64%
ICAPM	5.59%	0.00%	7.82%
ICAPM Redux	0.00%	1.68%	0.00%
P-CAPM	0.00%	0.00%	0.00%

More: Time-series regressions on politically sorted portfolios

Cross-sectional asset pricing: Country level

	(a) Global			(b) Developed			(c) Emerging		
	MKT	Dollar	PG	MKT	Dollar	PD	MKT	Dollar	PE
Risk premium	0.062*	0.009	0.084*	0.070*	0.000	-0.112*	0.061	0.037*	0.153*
	(0.052)	(0.644)	(0.067)	(0.034)	(0.985)	(0.008)	(0.112)	(0.083)	(0.047)
R^2	0.520			0.425			0.770		
MAPE	0.022			0.018			0.016		
RMSE	0.008			0.006			0.006		
Factor mean	0.057*	0.010	0.085*	0.059*	0.008	-0.099*	0.057*	0.023	0.156*
	(0.090)	(0.462)	(0.047)	(0.079)	(0.679)	(0.004)	(0.090)	(0.106)	(0.028)

Realized vs predicted returns: Pictorial representation



Realized vs predicted returns: Summary

	(a) Global			(b) Developed			(c) Emerging		
	α	β	R^2	α	β	R^2	α	β	R^2
World CAPM	4.44	0.53	0.10	2.19	0.72	0.27	6.60	0.35	0.03
FF3	3.40	0.62	0.16	1.72	0.71	0.29	5.12	0.53	0.10
Carhart	2.62	0.76	0.28	0.77	0.81	0.39	4.32	0.74	0.24
FF5	3.46	0.58	0.18	0.84	0.81	0.44	5.63	0.41	0.09
ICAPM	4.21	0.64	0.15	1.46	0.92	0.44	6.47	0.41	0.05
ICAPM Redux	3.11	0.60	0.18	1.38	0.87	0.38	4.25	0.52	0.13
P-CAPM	1.60	0.99	0.38	0.98	1.02	0.58	2.12	0.91	0.28

Robustness tests (1)

1. Fama-MacBeth regressions
   - When added to the benchmark models, the P-factor is always priced with almost identical premium, increase in R^2_{Adj} and reduction in MAPE
   - Almost identical performance of P-CAPM
2. Randomized experiment (Adrian et al, JF 2014)
   - A factor of random draws with replacement from the empirical P-factor distribution explains none of the cross-sectional returns variability
   - Same finding with a random gaussian factor with identical mean and variance as the P-factor

Robustness tests (2)

1. Out-of-sample testing adding frontier markets
   - P-factor priced in set of test assets Global^{+}
   - P-CAPM has still better explanatory and predictive power
2. P-CAPM with univariate ICRG political risk factor
   - ICRG factor priced only in developed markets
   - Strong underestimation of risk premium with respect to the P-factor

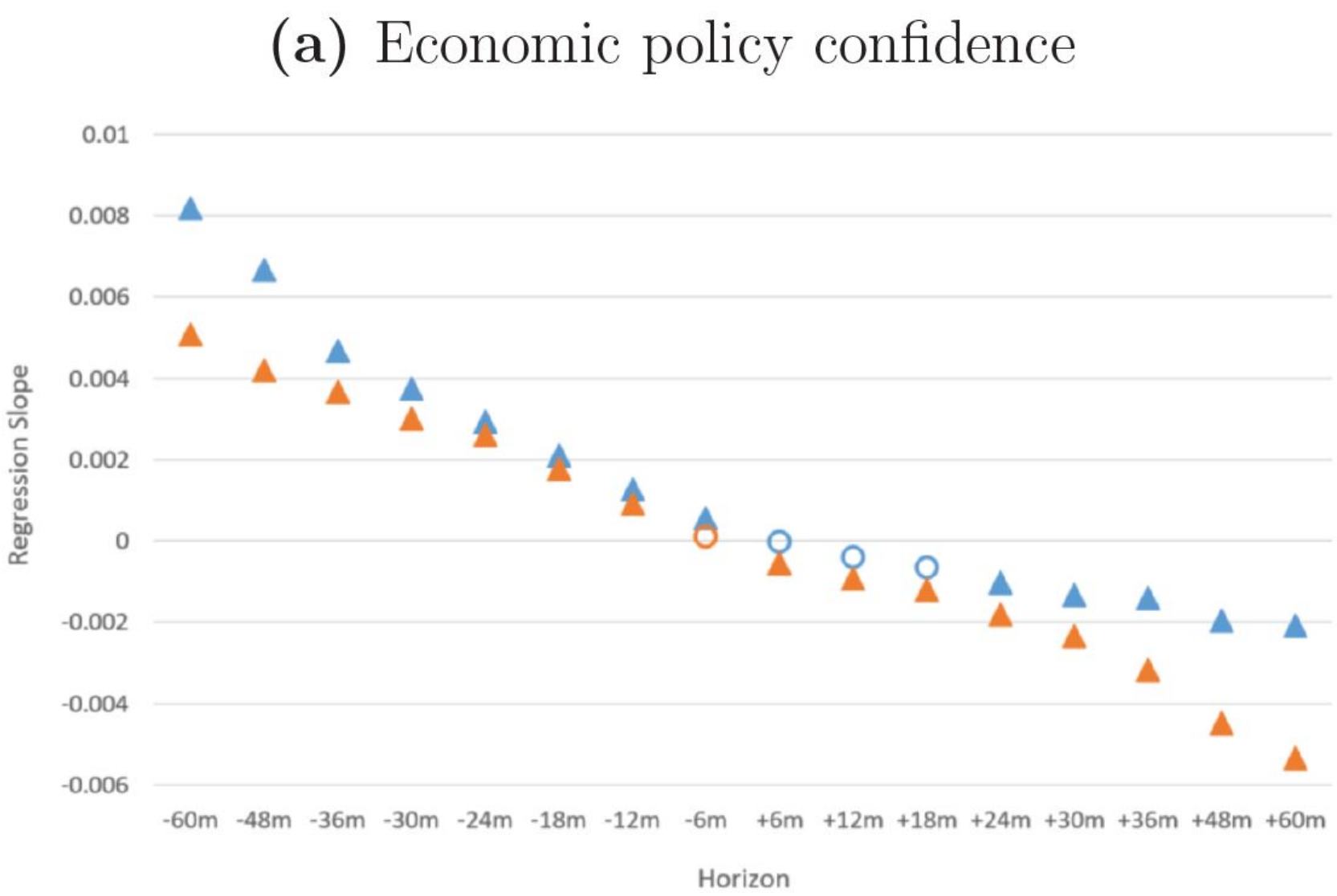
Political risk sign paradox: Background

- In *developed* markets, more (less) political risk entails lower (higher) returns
- References: Diamonte et al. (1996), Perotti and Van Oijen (2001), Lekhonen and Heimonen (2015), Dimic et al. (2015)
- The negative sign of the risk premium on the P-factor in developed markets is consistent with the literature on the sign paradox
- We explain the paradox, which is only apparent

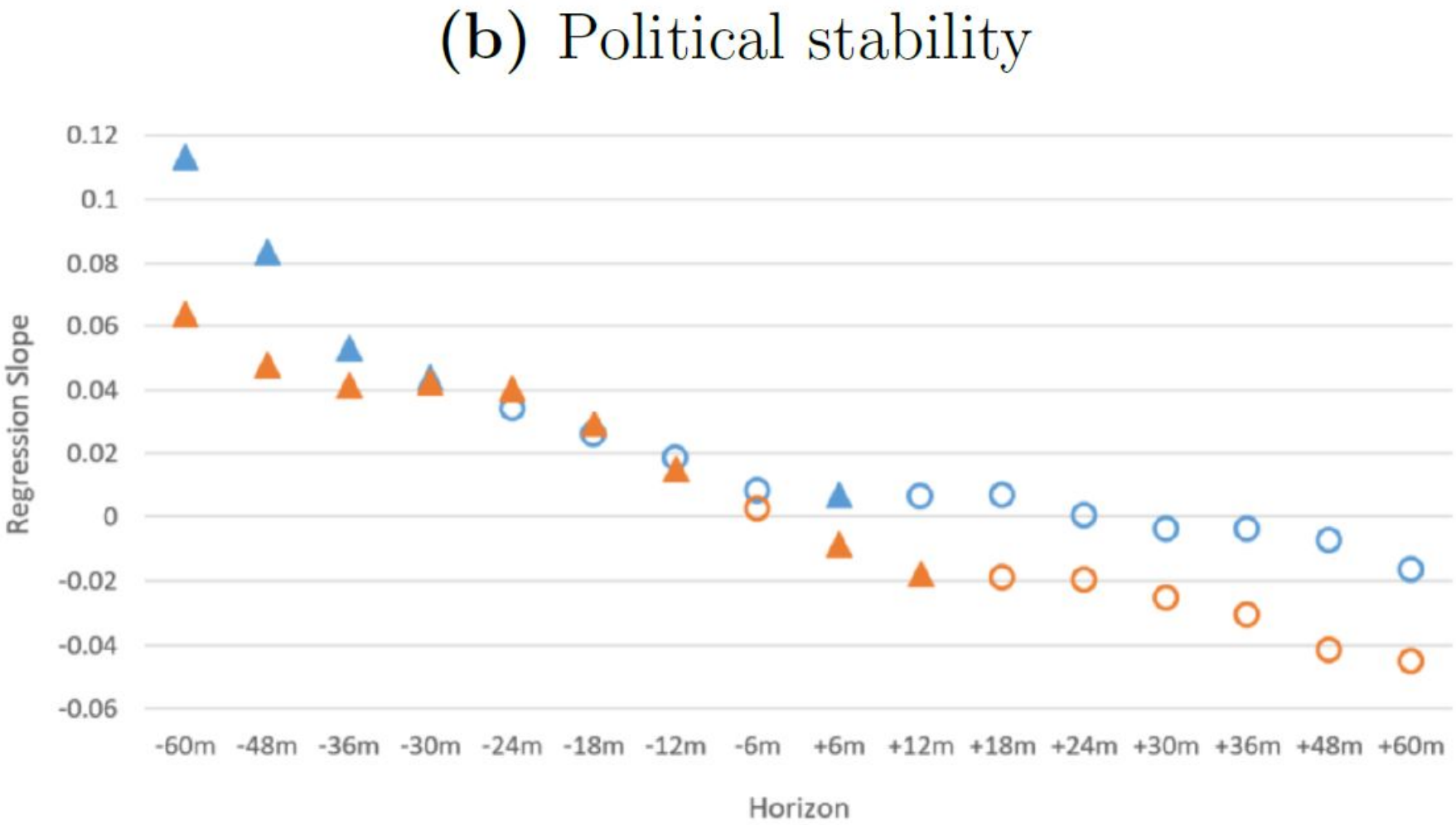
Political risk sign paradox: Testing

- We reconcile the empirical evidence in the aforementioned studies with a risk-based explanation of our findings
- **Test #1:**
  - **Tool:** Lead-lag panel regressions of stock market returns on politics/policy state variables
  - **Goal:** Disentangle the impact on *realized* vs *expected* returns
- **Test #2:**
  - **Tool:** Portfolio sorts on **Daily** Thomson Reuters MarketPsych Sentiment Indices ("Political Instability" and "Economic Uncertainty")
  - **Goal:** Corroborate the evidence on the impact of politics and policy on contemporaneous returns

Lead-lag regressions - Economic policy



Lead-lag regressions - Political stability



Returns of portfolio sorts with Daily Sentiment Indices

	Developed	Emerging
H_{SI}	0.034	0.017
M_{SI}	0.076	0.069
L_{SI}	0.116	0.195
L_{SI}-H_{SI}	0.082*	0.178*
p-value	(0.095)	(0.008)
Sharpe Ratio	0.385	0.612

Conclusions

1. Guided by the Nobel-prize winning theory of Douglass C. North, we construct a bivariate political risk factor
2. The P-factor is not spanned by prominent benchmarks
3. The P-factor is priced in developed, emerging and frontier markets, with risk premium up to 15% p.a.
4. We propose a three-factor Political CAPM
5. P-CAPM has significantly higher cross-sectional R^2, lower MAPE, and better predictive power than all existing models
6. Our *bivariate* factor has better performance than the univariate ICRG political risk factor

Politics and policy ratings

(a) Developed

	Stability		Policy	
	Mean	StDev	Mean	StDev
Austria	7.63	0.78	50.51	21.75
Belgium	5.70	1.39	41.60	22.69
Denmark	7.38	0.96	64.67	24.66
Finland	7.93	0.78	61.33	31.63
France	6.69	1.07	30.46	22.92
Germany	7.36	0.47	30.42	22.44
Greece	6.19	2.32	29.20	30.31
Ireland	7.07	0.92	60.34	33.09
Italy	4.01	1.32	15.24	13.36
Netherlands	7.33	1.11	62.86	24.66
Norway	7.60	1.17	72.38	26.04
Spain	6.09	1.52	39.17	28.37
Sweden	6.67	1.19	51.01	27.93
Switzerland	7.94	0.75	65.71	19.49
UK	6.88	1.41	44.44	29.34
Canada	6.49	1.32	68.69	23.42
USA	7.21	0.93	35.88	27.03
Hong-Kong	5.70	1.19	30.99	22.42
Japan	5.95	0.99	18.68	14.90
Australia	7.18	1.21	53.59	27.65
New Zealand	6.27	1.12	50.23	28.31
Portugal	6.83	1.53	36.90	27.08
Average	6.73	1.17	46.09	25.23

(b) Emerging

	Stability		Policy	
	Mean	StDev	Mean	StDev
Czech republic	4.98	1.59	34.14	28.87
Hungary	5.63	1.35	16.74	16.59
Poland	4.90	1.50	26.84	20.19
Russia	3.95	1.59	15.67	13.73
Brazil	4.83	1.72	32.48	23.73
Chile	6.99	1.10	62.01	30.70
Colombia	4.19	1.48	41.95	23.99
Mexico	4.68	1.17	26.37	23.00
Peru	3.71	1.38	39.55	24.02
Israel	3.97	1.83	26.03	21.02
Turkey	3.79	1.51	23.18	21.97
China	5.27	0.73	62.04	22.40
India	4.48	1.69	36.89	24.70
South Korea	4.92	0.77	21.89	18.61
Malaysia	5.33	1.58	44.80	32.76
Philippines	4.28	1.59	31.47	30.29
Taiwan	4.37	1.45	6.72	12.53
Thailand	3.18	1.28	17.70	19.43
Egypt	3.89	1.45	12.32	17.08
South Africa	4.48	1.45	27.91	21.68
Average	4.59	1.42	30.34	22.58

(c) Global

	Stability		Policy	
	Mean	StDev	Mean	StDev
Average	5.71	1.29	38.59	23.97

Back to presentation

Spanning regressions

	(a) PG		(b) PD		(c) PE	
	α	R^2	α	R^2	α	R^2
World CAPM	0.076*	0.014	-0.101*	-0.003	0.141*	0.011
	(0.073)		(0.004)		(0.031)	
FF3	0.078*	0.039	-0.119*	0.013	0.167*	0.022
	(0.064)		(0.001)		(0.013)	
Carhart	0.089*	0.042	-0.119*	0.009	0.177*	0.020
	(0.037)		(0.001)		(0.007)	
FF5	0.097*	0.048	-0.095*	0.018	0.191*	0.020
	(0.026)		(0.014)		(0.007)	
ICAPM	0.066	0.055	-0.102*	-0.006	0.137*	0.007
	(0.117)		(0.003)		(0.039)	
ICAPM Redux	0.062	0.037	-0.102*	-0.008	0.157*	0.016
	(0.163)		(0.004)		(0.022)	
Factor mean	0.085*		-0.099*		0.156*	
	(0.047)		(0.004)		(0.028)	

Back to presentation

Beta-sorted portfolios

	(a) Global			(b) Developed			(c) Emerging		
	Politics	Policy	Return	Politics	Policy	Return	Politics	Policy	Return
H_β	4.389	20.926	0.142	5.467	23.493	0.036	4.368	24.611	0.176
M_β	5.699	40.080	0.071	6.862	47.775	0.073	4.708	29.529	0.087
L_β	7.172	52.594	0.070	7.586	62.872	0.093	4.529	39.397	0.059
L_β-H_β	2.783*	31.668*	-0.071*	2.120*	39.379*	0.058*	0.161*	14.787*	-0.117*
p-value	(0.000)	(0.000)	(0.078)	(0.000)	(0.000)	(0.016)	(0.052)	(0.000)	(0.055)

Back to presentation

Principal Component Analysis

Factor	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11	PC12	PC13
PG	0.074	-0.238	-0.009	0.476	-0.162	0.749	0.042	-0.197	-0.268	0.094	0.032	-0.024	-0.003
MKT	0.486	-0.121	0.140	-0.097	-0.120	-0.029	0.266	-0.077	0.229	0.141	0.165	0.029	-0.727
MKTLC	0.431	-0.251	0.214	-0.088	-0.118	-0.061	0.290	-0.102	0.256	0.145	0.182	0.100	0.676
SMB	0.022	0.065	-0.304	0.704	0.231	-0.212	-0.107	0.074	0.475	0.148	0.198	0.072	0.001
HML	-0.107	0.387	0.495	0.245	-0.064	-0.002	0.232	-0.147	0.204	0.177	-0.616	0.046	-0.002
WML	-0.152	-0.069	-0.421	-0.080	0.425	0.026	0.750	-0.104	-0.101	0.051	-0.143	-0.003	0.000
CMA	-0.240	0.398	0.338	0.174	-0.089	-0.077	0.358	0.117	-0.254	-0.061	0.642	-0.054	0.003
RMW	-0.258	0.168	0.100	-0.366	0.298	0.557	-0.098	0.044	0.528	0.143	0.224	0.037	0.002
EUR	0.308	0.422	-0.154	-0.010	0.062	0.127	-0.025	-0.297	-0.009	-0.547	0.019	0.542	0.031
GBP	0.289	0.328	-0.040	-0.096	0.327	-0.049	-0.237	-0.172	-0.396	0.657	0.068	0.088	0.044
JPY	0.066	0.284	-0.389	-0.085	-0.518	0.151	0.145	0.560	0.030	0.256	-0.105	0.227	0.050
Dollar	0.405	0.364	-0.134	0.006	0.066	0.135	0.019	0.082	0.068	-0.219	-0.064	-0.768	0.100
Carry	0.258	-0.146	0.318	0.113	0.476	0.112	0.014	0.674	-0.165	-0.162	-0.128	0.187	-0.012
Eigenvalue	0.266	0.179	0.121	0.095	0.091	0.066	0.054	0.040	0.036	0.034	0.013	0.006	0.000
Cumulative %	0.266	0.445	0.566	0.660	0.751	0.817	0.870	0.911	0.946	0.980	0.994	1.000	1.000

Back to presentation

Regressions of alternative factors on the P-factor

	(a) Global				(b) Developed				(c) Emerging			
	ρ	α	β	R^2	ρ	α	β	R^2	ρ	α	β	R^2
Policy-Stability WB	0.773	0.003	1.127*	0.597	0.627	-0.001	0.708*	0.393	0.723	0.015*	0.852*	0.522
		(0.150)	(0.000)			(0.706)	(0.000)			(0.002)	(0.000)	
Policy-Admin. restrictions	0.657	0.003	0.743*	0.432	0.568	0.001	0.609*	0.323	0.584	0.011*	0.557*	0.341
		(0.335)	(0.000)			(0.756)	(0.000)			(0.010)	(0.000)	
Policy-Corruption	0.834	0.000	1.045*	0.695	0.655	-0.001	0.690*	0.429	0.380	0.010*	0.375*	0.144
		(0.913)	(0.000)			(0.673)	(0.000)			(0.016)	(0.036)	
Policy-Govt. effectiveness	0.776	0.001	1.033*	0.602	0.697	0.002	0.700*	0.485	0.506	0.004	0.504*	0.256
		(0.744)	(0.000)			(0.383)	(0.000)			(0.272)	(0.000)	
Policy-Reg. quality	0.780	-0.001	0.960*	0.609	0.610	-0.002	0.702*	0.372	0.370	0.009*	0.355*	0.137
		(0.665)	(0.000)			(0.510)	(0.000)			(0.031)	(0.022)	
Policy-Rule of law	0.748	0.001	1.140*	0.560	0.685	-0.001	0.818*	0.469	0.462	0.008	0.550*	0.214
		(0.770)	(0.000)			(0.720)	(0.000)			(0.143)	(0.000)	
Policy-Voice and account.	0.750	0.002	1.040*	0.563	0.749	-0.001	0.724*	0.562	0.661	0.004	0.844*	0.437
		(0.514)	(0.000)			(0.478)	(0.000)			(0.398)	(0.000)	
ICRG political risk	0.552	0.001	0.458*	0.304	0.484	-0.001	0.299*	0.234	0.327	0.006*	0.210*	0.107
		(0.605)	(0.000)			(0.439)	(0.000)			(0.056)	(0.000)	

Back to presentation

Risk premium on the P-factor: Global markets

Subtable I. Global

	World CAPM		Fama-French three-factor				Carhart				
	MKT	PG	MKT	SMB	HML	PG	MKT	SMB	HML	WML	PG
Premium	0.074*		0.067*	0.011	-0.014		0.068*	0.013	-0.021	0.060	
	(0.028)		(0.040)	(0.655)	(0.607)		(0.038)	(0.602)	(0.409)	(0.121)	
R^2	0.284		0.319				0.351				
MAPE	0.026		0.025				0.024				
RMSE	0.010		0.009				0.009				
Premium	0.062*	0.084*	0.064*	-0.007	-0.002	0.085*	0.065*	-0.007	-0.010	0.061	0.083*
	(0.059)	(0.068)	(0.049)	(0.762)	(0.950)	(0.066)	(0.046)	(0.783)	(0.679)	(0.115)	(0.073)
R^2	0.519		0.525				0.585				
MAPE	0.022		0.021				0.020				
RMSE	0.008		0.008				0.007				

	Fama-French five-factor						ICAPM					ICAPM Redux			
	MKT	SMB	HML	CMA	RMW	PG	MKT	EUR	GBP	JPY	PG	MKTLC	Dollar	Carry	PG
Premium	0.065*	-0.002	-0.014	-0.027	0.024		0.078*	-0.013	-0.012	-0.006		0.069*	0.009	0.049	
	(0.046)	(0.944)	(0.597)	(0.319)	(0.276)		(0.023)	(0.687)	(0.704)	(0.855)		(0.033)	(0.636)	(0.188)	
R^2	0.411						0.347					0.319			
MAPE	0.024						0.026					0.026			
RMSE	0.009						0.009					0.009			
Premium	0.066*	-0.017	-0.002	-0.002	0.022	0.082*	0.063*	0.002	-0.002	-0.004	0.084*	0.060*	0.009	0.015	0.085*
	(0.042)	(0.467)	(0.945)	(0.939)	(0.327)	(0.070)	(0.051)	(0.960)	(0.938)	(0.918)	(0.066)	(0.055)	(0.642)	(0.651)	(0.061)
R^2	0.567						0.520					0.519			
MAPE	0.021						0.022					0.022			
RMSE	0.007						0.008					0.008			

Back to presentation

Risk premium on the P-factor: Developed markets

Subtable II. Developed

	World CAPM		Fama-French three-factor				Carhart				
	MKT	PD	MKT	SMB	HML	PD	MKT	SMB	HML	WML	PD
Premium	0.061*		0.065*	-0.019	-0.018		0.065*	-0.020	-0.016	0.077*	
	(0.066)		(0.046)	(0.325)	(0.494)		(0.048)	(0.292)	(0.530)	(0.014)	
R^2	-0.038		0.104				0.184				
MAPE	0.023		0.022				0.021				
RMSE	0.009		0.008				0.007				
Premium	0.064*	-0.116*	0.064*	-0.009	-0.011	-0.112*	0.064*	-0.010	-0.009	0.076*	-0.111*
	(0.053)	(0.008)	(0.050)	(0.650)	(0.676)	(0.008)	(0.052)	(0.606)	(0.706)	(0.015)	(0.009)
R^2	0.375		0.373				0.441				
MAPE	0.019		0.019				0.018				
RMSE	0.006		0.006				0.006				

	Fama-French five-factor						ICAPM					ICAPM Redux			
	MKT	SMB	HML	CMA	RMW	PD	MKT	EUR	GBP	JPY	PD	MKTLC	Dollar	Carry	PD
Premium	0.066*	-0.018	-0.019	0.006	0.028		0.071*	-0.022	-0.029	-0.005		0.076*	-0.011	0.048*	
	(0.046)	(0.355)	(0.472)	(0.780)	(0.129)		(0.029)	(0.423)	(0.240)	(0.859)		(0.018)	(0.647)	(0.060)	
R^2	0.261						0.213					0.144			
MAPE	0.021						0.019					0.019			
RMSE	0.007						0.007					0.007			
Premium	0.065*	-0.012	-0.009	0.006	0.015	-0.105*	0.072*	-0.015	-0.025	-0.006	-0.110*	0.072*	-0.002	0.049*	-0.112*
	(0.048)	(0.529)	(0.727)	(0.785)	(0.369)	(0.011)	(0.029)	(0.592)	(0.321)	(0.837)	(0.010)	(0.024)	(0.944)	(0.056)	(0.009)
R^2	0.338						0.532					0.506			
MAPE	0.021						0.016					0.015			
RMSE	0.006						0.005					0.006			

Back to presentation

Risk premium on the P-factor: Emerging markets

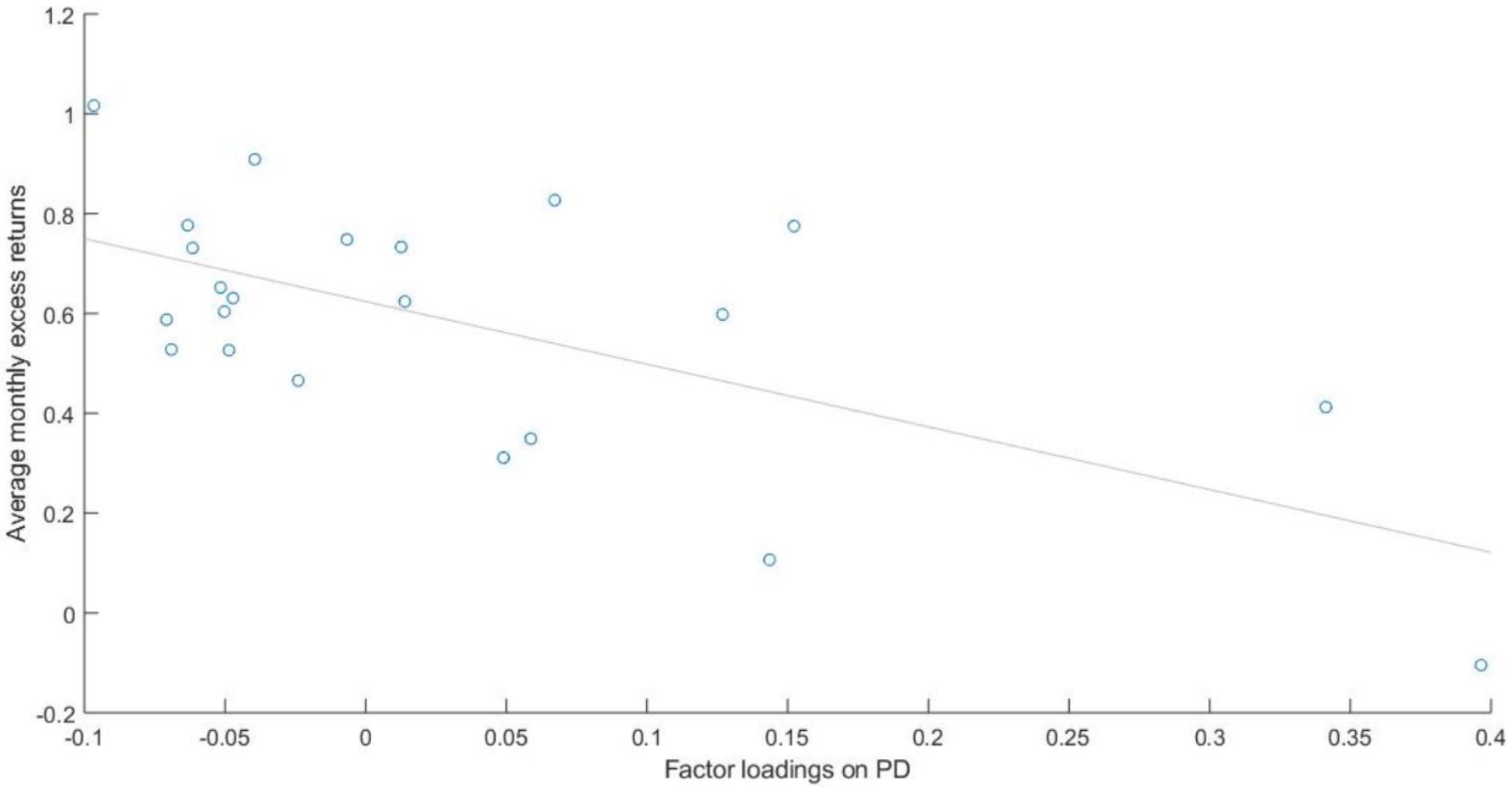
Subtable III. Emerging

	World CAPM		Fama-French three-factor				Carhart				
	MKT	PE	MKT	SMB	HML	PE	MKT	SMB	HML	WML	PE
Premium	0.085*		0.078*	0.005	0.024		0.082*	0.005	0.012	0.051	
	(0.029)		(0.053)	(0.843)	(0.399)		(0.044)	(0.854)	(0.679)	(0.191)	
R^2	0.467		0.497				0.509				
MAPE	0.027		0.025				0.024				
RMSE	0.009		0.009				0.008				
Premium	0.079*	0.150*	0.063	0.018	0.028	0.150*	0.066*	0.019	0.014	0.039	0.146*
	(0.041)	(0.049)	(0.103)	(0.496)	(0.333)	(0.049)	(0.088)	(0.468)	(0.607)	(0.301)	(0.055)
R^2	0.686		0.790				0.778				
MAPE	0.021		0.016				0.018				
RMSE	0.007		0.005				0.006				

	Fama-French five-factor						ICAPM					ICAPM Redux			
	MKT	SMB	HML	CMA	RMW	PE	MKT	EUR	GBP	JPY	PE	MKTLC	Dollar	Carry	PE
Premium	0.068*	0.003	0.029	-0.008	0.009		0.086*	0.010	0.027	-0.013		0.053	0.035*	0.097*	
	(0.075)	(0.912)	(0.299)	(0.743)	(0.757)		(0.030)	(0.768)	(0.416)	(0.722)		(0.143)	(0.091)	(0.029)	
R^2	0.517						0.495					0.524			
MAPE	0.025						0.026					0.022			
RMSE	0.008						0.008					0.008			
Premium	0.061	0.008	0.030	0.006	0.026	0.153*	0.079*	0.017	0.022	0.004	0.151*	0.039	0.039*	0.074*	0.134*
	(0.111)	(0.739)	(0.296)	(0.810)	(0.353)	(0.043)	(0.044)	(0.617)	(0.504)	(0.907)	(0.046)	(0.278)	(0.066)	(0.064)	(0.071)
R^2	0.811						0.706					0.748			
MAPE	0.016						0.020					0.018			
RMSE	0.005						0.006					0.006			

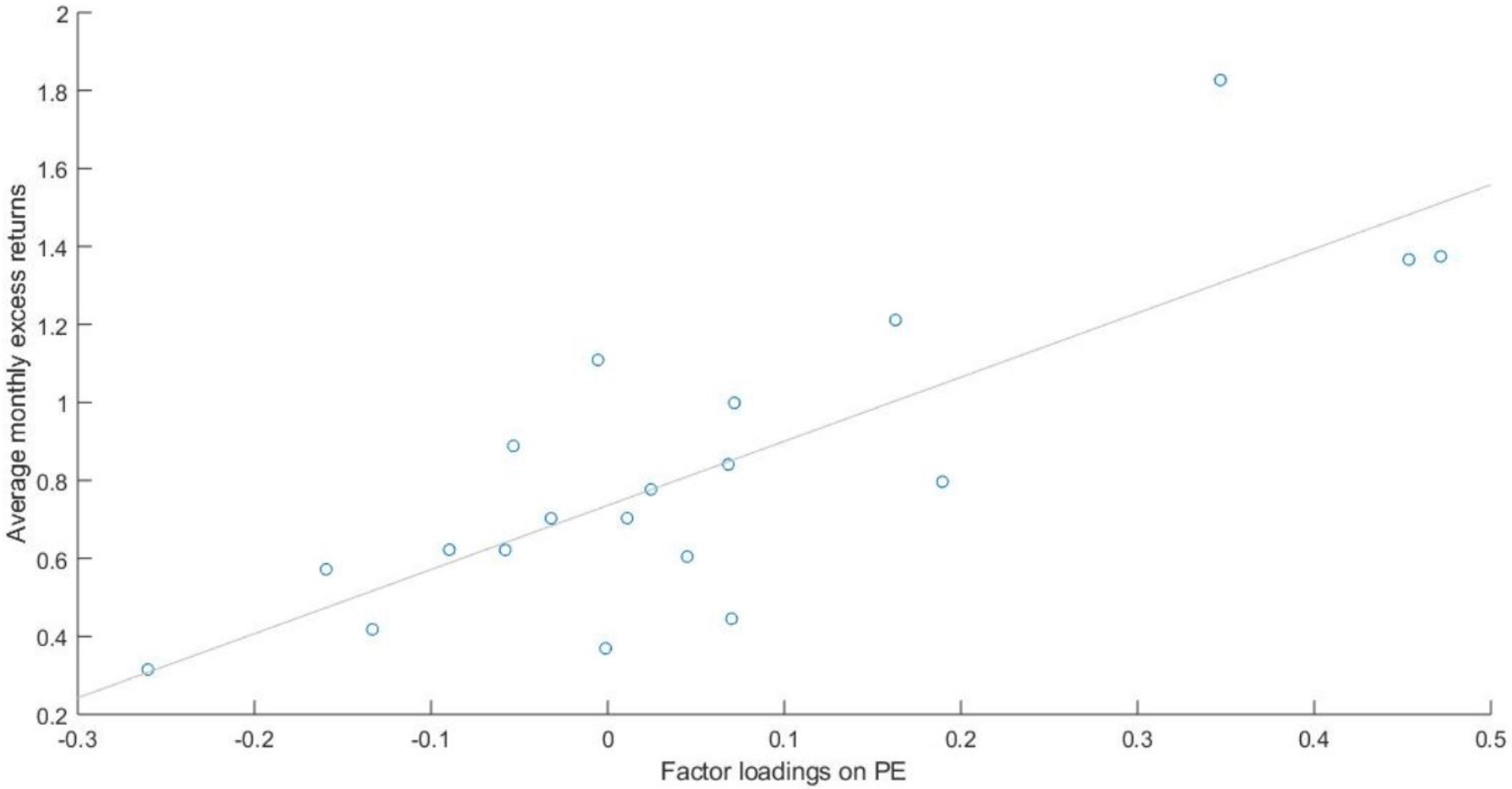
Back to presentation

Loadings on PD vs Average developed markets returns



Back to presentation

Loadings on PE vs Average emerging markets returns



Back to presentation

P-CAPM on politically sorted portfolios

	(a) Global				(b) Developed				(c) Emerging			
	MKT	Dollar	PG	R^2	MKT	Dollar	PD	R^2	MKT	Dollar	PE	R^2
H	1.012*	0.533*	-0.079*	0.846	1.006*	0.457*	-0.297*	0.786	0.929*	1.055*	-0.267*	0.602
	(0.000)	(0.000)	(0.011)		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	
M	0.960*	0.627*	0.106*	0.773	1.031*	0.288*	0.015	0.857	0.860*	1.144*	-0.073	0.491
	(0.000)	(0.000)	(0.006)		(0.000)	(0.000)	(0.513)		(0.000)	(0.000)	(0.102)	
L	1.012*	0.533*	0.921*	0.925	1.006*	0.457*	0.703*	0.843	0.929*	1.055*	0.733*	0.788
	(0.000)	(0.003)	(0.000)		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	

Back to presentation

P-CAPM with Fama-MacBeth regressions

	(a) Global			(b) Developed			(c) Emerging		
	MKT	Dollar	PG	MKT	Dollar	PD	MKT	Dollar	PE
Risk premium	0.062*	0.009	0.096*	0.070*	0.000	-0.112*	0.056	0.047	0.158*
	(0.086)	(0.702)	(0.088)	(0.054)	(0.987)	(0.002)	(0.187)	(0.102)	(0.065)
R^2	0.524			0.425			0.763		
MAPE	0.022			0.018			0.017		
RMSE	0.008			0.006			0.006		
Factor mean	0.057*	0.010	0.085*	0.059*	0.008	-0.099*	0.057*	0.023	0.156*
	(0.090)	(0.462)	(0.047)	(0.079)	(0.679)	(0.004)	(0.090)	(0.106)	(0.028)

Back to presentation

P-CAPM with random P-factors

	Global	Developed	Emerging
R^2	0.06%	0.03%	0.02%
MAPE	0.04%	0.12%	0.00%
Joint R^2-MAPE	0.02%	0.02%	0.00%
Average R^2	0.28	0.07	0.46

Back to presentation

Out-of-sample testing on set of test assets Global$^+$

	MKT	Dollar	PG
Risk premium	0.059*	0.017	0.083*
	(0.056)	(0.225)	(0.048)
R^2	0.123		
MAPE	0.037		
RMSE	0.016		
Factor mean	0.057*	0.010	0.085*
	(0.090)	(0.462)	(0.047)

Back to presentation

P-CAPM with univariate ICRG political risk factor

	(a) Global			(b) Developed			(c) Emerging		
	MKT	Dollar	IPG	MKT	Dollar	IPD	MKT	Dollar	IPE
Risk premium	0.065*	0.010	0.041	0.072*	0.008	-0.058*	0.072*	0.031	0.075
	(0.044)	(0.617)	(0.224)	(0.030)	(0.721)	(0.037)	(0.058)	(0.151)	(0.121)
R^2	0.432			0.545			0.601		
MAPE	0.023			0.015			0.022		
RMSE	0.008			0.005			0.008		
Factor mean	0.057*	0.010	0.052	0.059*	0.008	-0.046*	0.057*	0.023	0.110*
	(0.090)	(0.462)	(0.137)	(0.079)	(0.679)	(0.041)	(0.090)	(0.106)	(0.008)

Back to presentation