Stock Price Volatility and Political Uncertainty: Evidence from the Interwar Period

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Motivation

- „Excess volatility“ often regarded as key sign of the irrationality of equity markets
- Variability of returns during the Great Depression in the US crucial for Shiller‘s finding of „excess volatility“
- Equity premium puzzle may be less puzzling if, at certain points in time, the risk of a major disaster is not small
- Volatility was higher between the wars than after World War II
  - Case of the US: normal monthly return volatility 0.04 (CRSP value-weighted, post-45) vs. 0.18 in 1932 [0.07 average for the interwar years]:
  - Case of Germany: 0.042 post-50, 0.44 in 1923 [0.1 average interwar]

Hypothesis

- Schwert/Merton hypothesis: „With the benefit of hindsight, we know that the U.S. and world economies came out of the Depression quite well. At the time, however, investors could not have had such confident expectations.“ (Merton 1987)
- Barro (2006) finds in a calibration that 20th century excess returns, excess volatility can be accounted for by shifting risks of big, one-off shocks
- Russian Revolution occurred a mere 15 years earlier

Alternative hypotheses

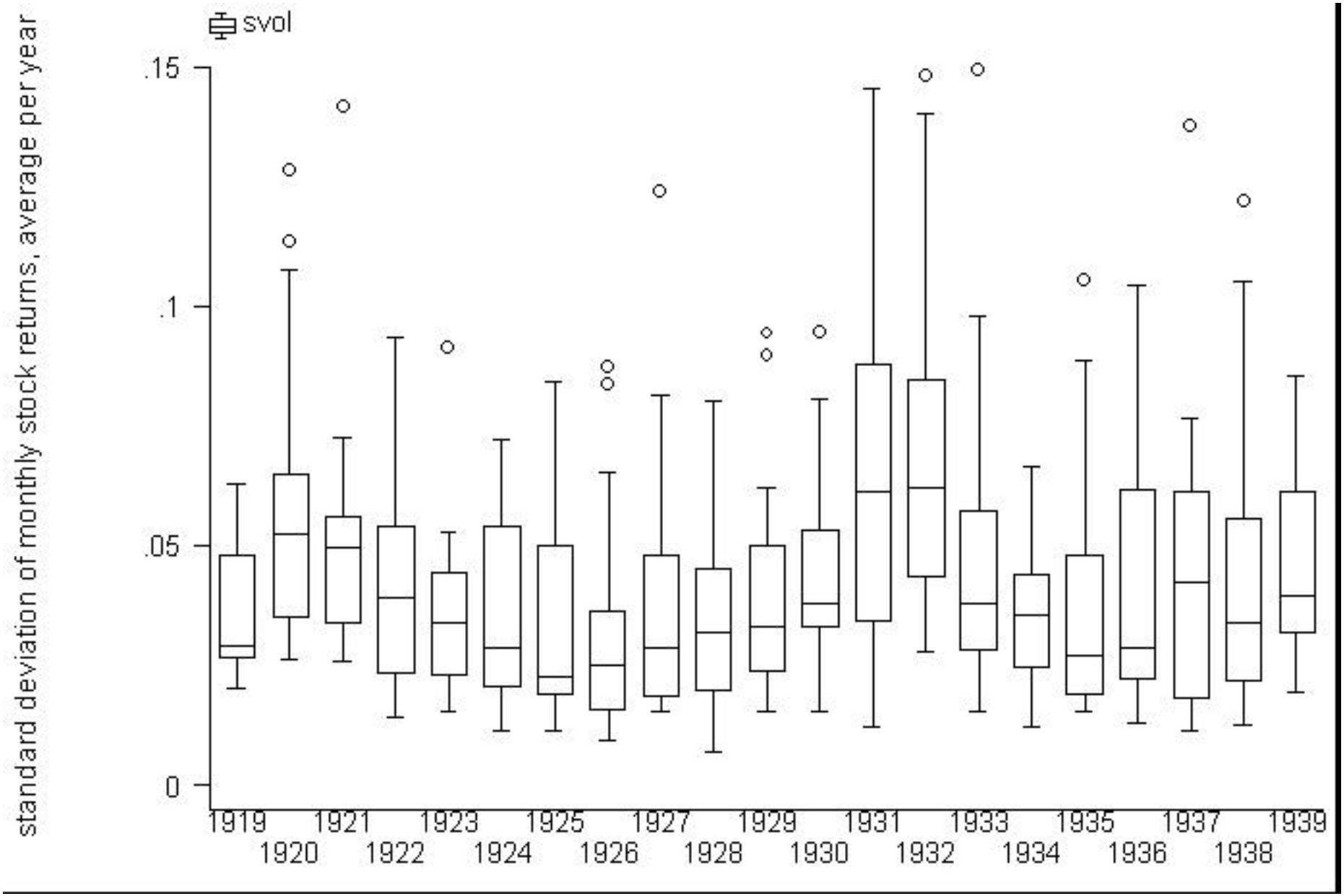
- Stock prices were driven by irrational mood swings on the part of investors
  - Investors had bigger mood swings between the wars/were more „irrational“ → not an appealing explanation
- Fundamentals (other than the survival of capitalism) were more volatile (dividends, inflation, interest rates, etc.)

Empirical strategy

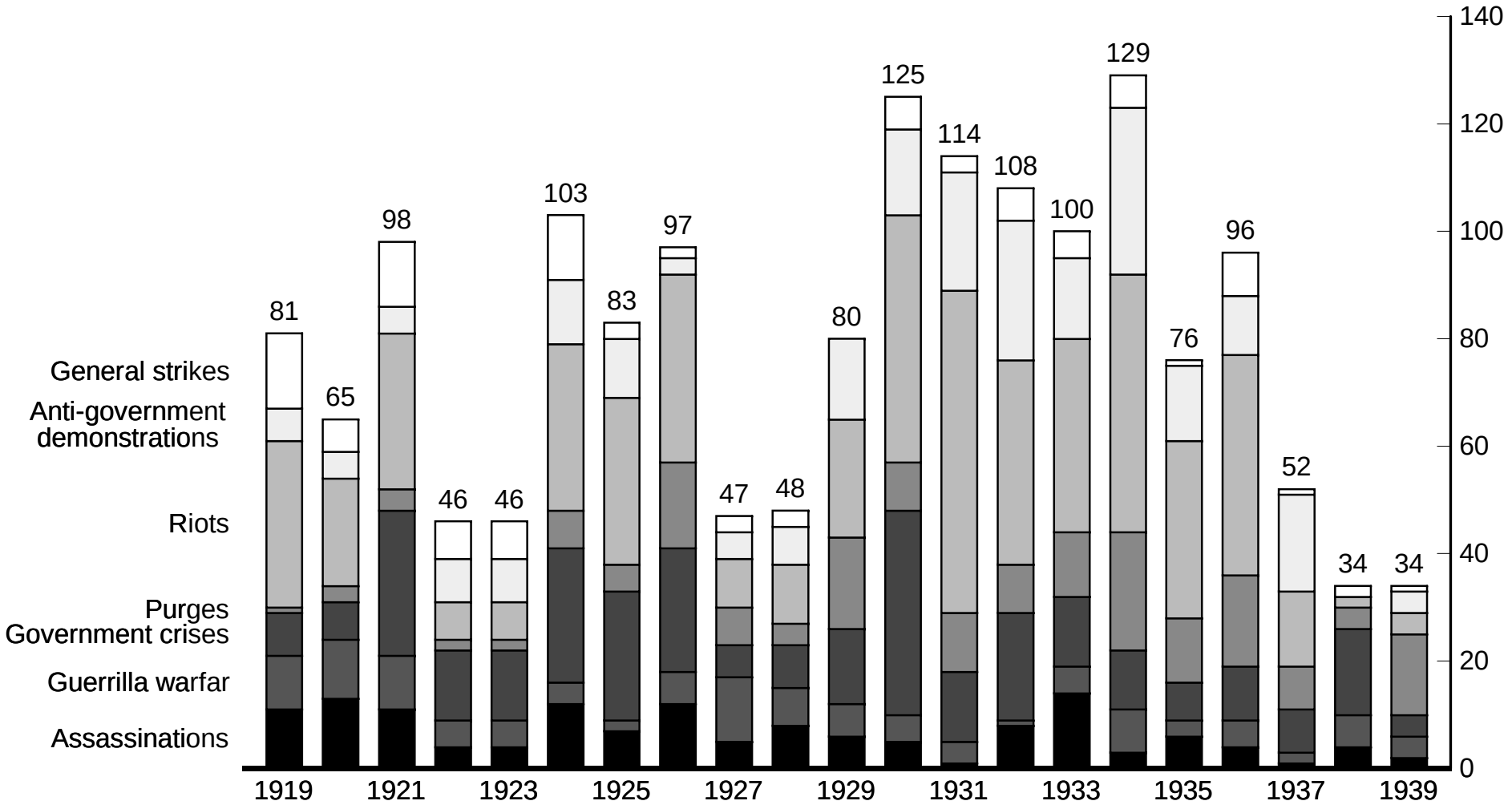
- Use data from 32 countries – if the Schwert/Merton hypothesis is right for the US, it should have applied even more strongly elsewhere
- Measure political and social instability
- Try to explain share price volatility by political and social unrest, controlling for the impact of other „fundamentals“
- **Limitation**: Can‘t distinguish between investors overreacting to how political uncertainty affects short-run macro fundamentals and how it impacts their perceptions re. the survival of capitalism

Related literature

- Rietz (JME 1988) models equity returns in a consumption CAPM with a „disaster“-state; shows that equity premium puzzle can be qualified if possibility of disaster is not too small
- Reinforcing factor: correlated risks [equity value will be low when real estate, labor income collapse]
- Mei (1999) shows that stock market volatility in the 3rd world is higher during election periods
- Bittlingmayer (1998) examines stock market volatility and political risk in interwar Germany
- Berglund and Hördahl (1998) demonstrate that bond return volatility in Sweden during the runup to its EU membership referendum was especially high



Volatility of monthly returns, average per year, cross-sections over time



Political events, total per year

Plausibility and Background

- History of „something that did not happen“
- Value of approach rests on plausibility that contemporaries should have worried much more about the future of capitalism than was warranted by subsequent events
- Three cases: Germany, Switzerland, USA
  - Germany experiences revolution after defeat in WWI, new democratic order weak (Kapp-Putsch, Hitler-Beerhall-Putsch, Spartacus-Insurgency, Communist insurgencies in the Rhineland and Thuringia in 1923, invasion by France and Belgium, hyperinflation); year of maximum turmoil coincides with highest level of stock price volatility in our sample; share prices extremely low: value of Daimler Motor works in 1922=327 of their cars; average volatility (0.103) highest in sample, peak in 1923 (0.44)

Plausibility and Background-2

- Switzerland: 0.041 average volatility (annual st.dev. of monthly real returns), second-lowest in the sample, very low levels of unrest: no anti-government demonstrations, no strikes, no guerrilla warfare, no government crises, no purges, 1 riot, 2 assassinations
- USA
  - 1931: “a malaise was seizing many Americans, a sense at once depressing and exhilarating, that capitalism itself was finished” [Schlesinger 1957, 205]; Hoover urges Congress not to cut number of infantry units in order not to “lessen our means of maintaining domestic peace and order”; asks Congress in secret message not to cut army pay
  - 1932, „bonus army“ marches on Washington; General MacArthur uses cavalry, tanks and infantry to dislodge the veterans
  - 1932: 9 demonstrations, 10 riots, 2 politically motivated strikes
  - Average volatility second-highest in the sample (0.071), peak in 1932 (0.182)

Washington, July 29th, 1932

General MacArthur, on the day of the attack on the veteran‘s camp

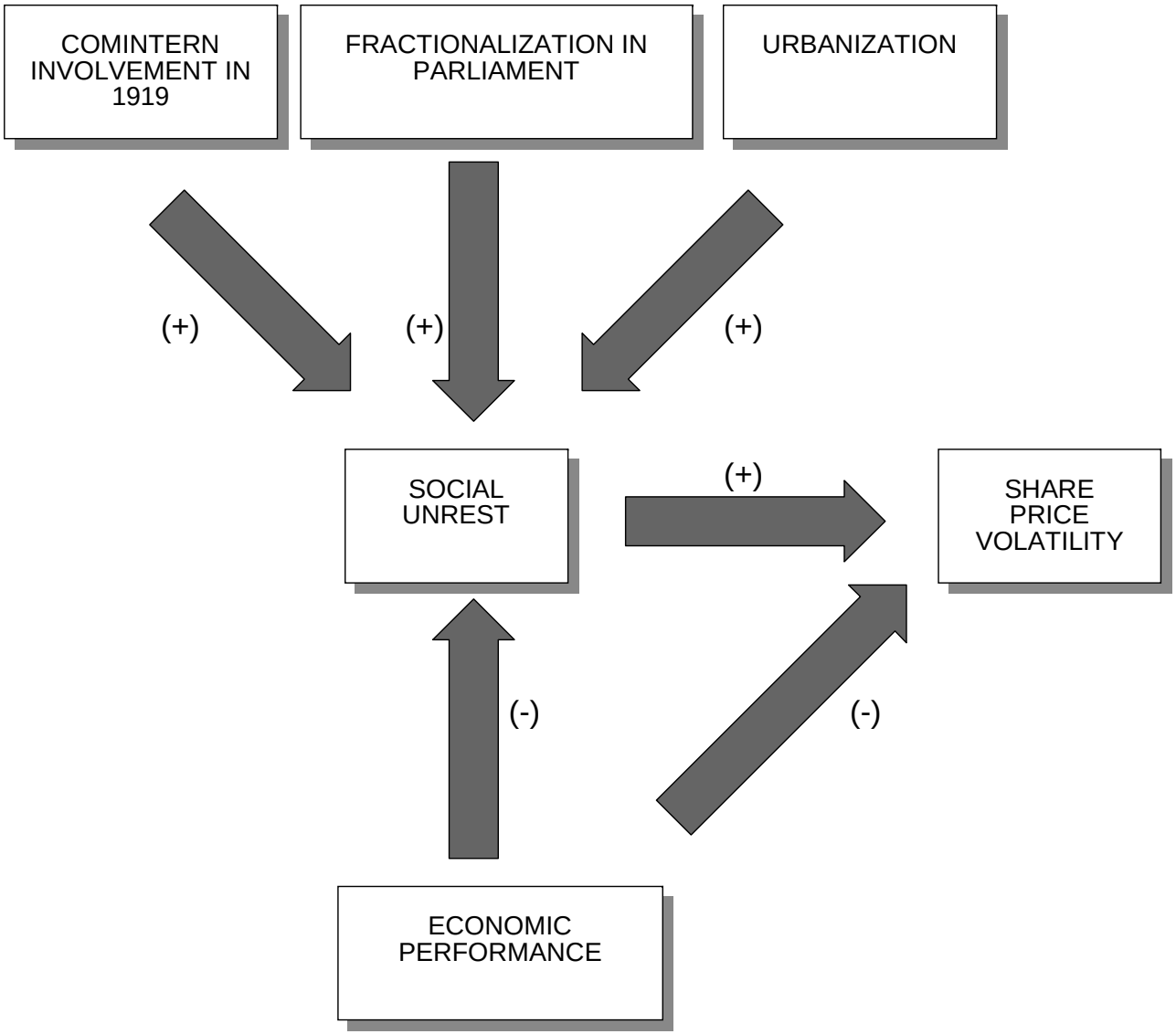
„That mob was a bad looking mob. It was animated by the essence of revolution. The gentleness, the consideration, with which they had been treated had been mistaken for weakness and they had come to the conclusion, beyond the shadow of a doubt, that they were about to take over in some arbitrary way either the direct control of the government or else to control it by indirect methods. It is my opinion that had the President ... let it go on another week the institutions of our government would have been very severely threatened.“

"All over the world, governments today are actively engaged, on a scale unprecedented in history, in restricting trade and enterprise and undermining the basis of capitalism. Such a policy is not confined to the socialists.

Such policies... Have a cumulative tendency. They lead to an order of society which is likely to be less stable, less free, less productive... They lead to an intensification of nationalism and to an enhancement of the causes which lead to civil strife... We have not yet travelled far down the Austrian road. We we deceive ourselves if we think we can stand indefinitely fluctuations of the present order of intensity."

-- Lionel Robbins, *The Great Depression*, 1934

Hypothesized Relationships



Thinking about the Impact of „Disaster“

- If π is probability of a catastrophic event (such as communist take-over, major disruption due to civil war, expropriations, etc.), then

$$\prod_{j=0}^{k}(1-\pi_{t+j})$$

  is the joint probability of a catastrophic event NOT occurring between time t and t+k
- If we write the price of equity as in the standard discounted dividend model, adjusting for the probability of a catastrophic event, we have

$$p_t = E_t \sum_{k=0}^{\infty}(\prod_{j=0}^{k}(\gamma(1-\pi_{t+j})))d_{t+k}$$

Thinking about the Impact of „Disaster“-2

- Where $\gamma = 1/(1+r_t)$ is the discount factor, and r the interest rate
- π has to have a st.dev. of at least 0.05 to explain stock price volatility 1929-38
- Then regress observations of return volatility σ on measures of political instability P and macro controls X, with fixed effects to account for country heterogeneity:

$$\sigma_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 P_{it} + \varepsilon_{it}$$

Observable implications

- Do share prices fall when political instability increases?
- Do indicators of civic unrest and social upheaval predict attempted violent overthrows of the government?
- Is share price volatility high when measures of unrest vary strongly/are high?

Descriptive Statistics

Real stock returns in 32 countries, 1919-1938

Continuously compounded monthly returns and measures of volatility, based on monthly returns. The standard deviation is calculated on the basis of monthly returns for each year. For details of the data, cf. the Appendix I.

	average volatility	Largest monthly gain	Largest monthly loss	average annual return	highest volatility	year of highest volatility	ratio max/ average
*Full sample**							
Australia	0.027	0.24	-0.13	0.063	0.094	1930	3.48
Belgium	0.070	0.27	-0.17	-0.064	0.105	1931	1.50
Canada	0.046	0.22	-0.30	0.048	0.122	1932	2.65
Denmark	0.025	0.18	-0.10	0.01	0.063	1925	2.52
France	0.057	0.20	-0.18	-0.027	0.095	1936	1.67
Germany	0.103	0.61	-0.52	0.055	0.435	1923	4.22
Italy	0.050	0.24	-0.21	-0.047	0.099	1932	1.98
Japan	0.042	0.20	-0.31	0.002	0.13	1920	3.10
Netherlands	0.044	0.23	-0.15	-0.025	0.085	1932	1.94
Norway	0.026	0.10	-0.09	0.010	0.053	1932	2.06
Poland	0.144	0.83	-0.87	-0.03	0.53	1923	3.68
South Africa	0.032	0.24	-0.38	0.05	0.108	1920	3.38
Sweden	0.046	0.18	-0.39	0.016	0.148	1932	3.22
Switzerland	0.041	0.27	-0.23	0.048	0.088	1931	2.16
UK	0.031	0.11	-0.11	0.018	0.064	1931	2.08
USA	0.071	0.35	-0.35	0.037	0.182	1932	2.58

Descriptive Statistics-2

Measures of Political Instability

The data is from Banks (1976), and shows the number of events per country and year. All data is for the years 1919-1939, where available. The last column gives the ratio of the average number of events in the 32 country sample divided by the average number of events in the 166 nation sample.

	32 Country Interwar Sample				166 Nation Sample				
	average	st.dev.	max	N	average	st.dev.	max	N	ratio averages
Number of assassinations	0.23	0.67	7	685	0.14	0.51	9	4066	1.64
general strikes	0.16	0.48	3	685	0.11	0.51	13	4066	1.45
guerrilla warfare	0.22	0.75	7	685	0.28	1.09	34	4066	0.79
government crises	0.46	0.94	6	685	0.30	0.73	7	4066	1.53
purges	0.29	0.7	5	685	0.34	1.01	34	4066	0.85
riots	0.87	2.16	22	685	0.64	2.18	55	4066	1.36
revolutions	0.17	0.50	4	685	0.20	0.56	6	4066	0.85
anti-government demonstrations	0.38	1.04	11	685	0.35	1.69	60	4066	1.09

Descriptive Statistics-3

Correlations of variables

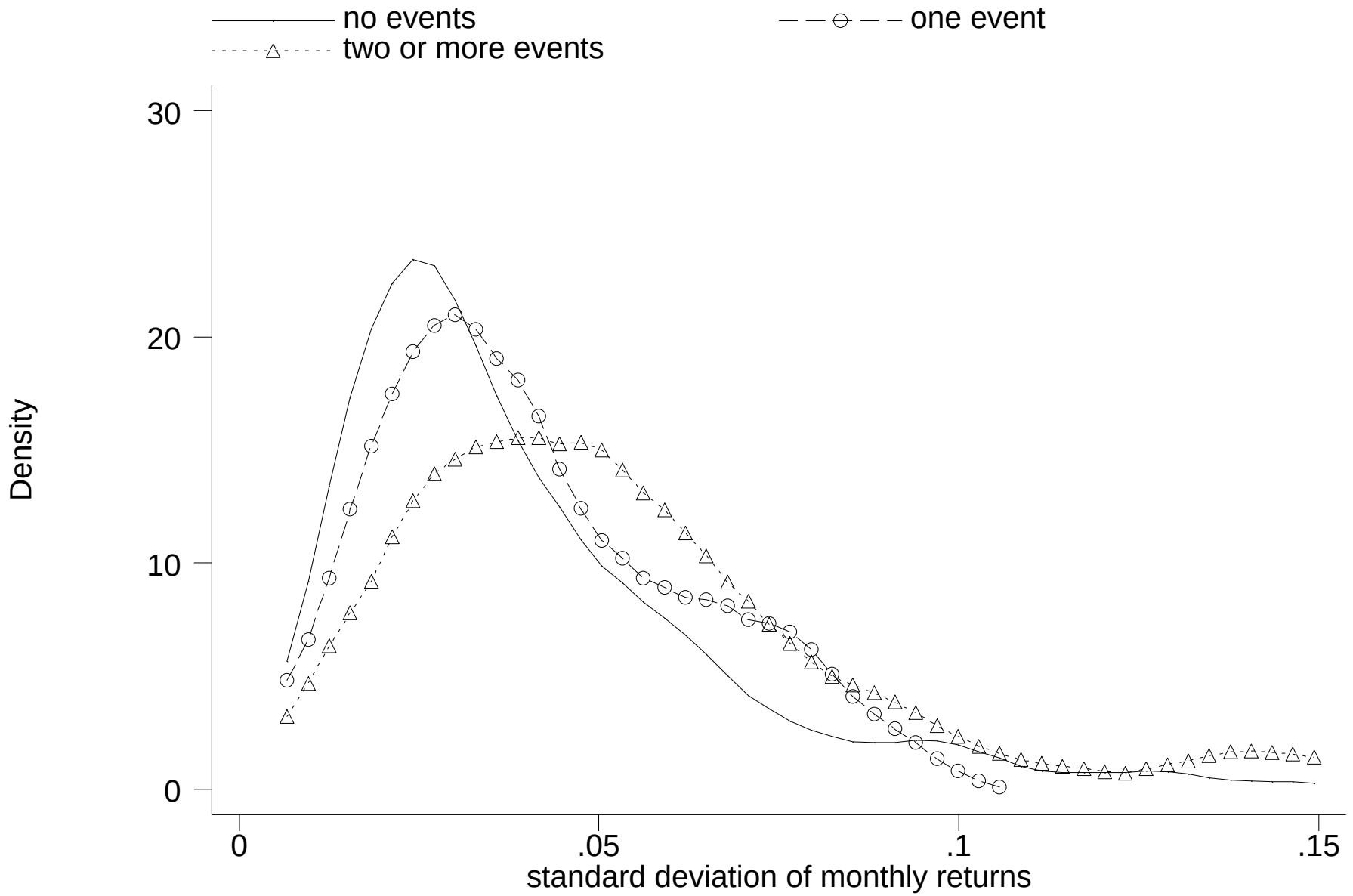
Return is the log of the stock price index at time t, divided by its value at time t-1. Xcons is constraints on the executive, according to the POLITY III dataset. The other variables are defined in the appendix.

	Return	Demo	Ass	Strike	Riot	Cris	Rev	Growth	Purge
Return	1								
Demo	-0.2080*	1							
Ass	0.0086	0.2439*	1						
Strike	-0.3763*	0.2824*	0.2276*	1					
Riot	-0.0504	0.5501*	0.2398*	0.3797*	1				
Cris	-0.1769*	0.5684*	0.0587	0.3372*	0.3974*	1			
Rev	0.0674	0.3824*	0.3409*	0.3436*	0.2525*	0.5096*	1		
Growth	0.2265*	-0.2400*	-0.0735	0.1543	-0.1914*	-0.0581	0.0188	1	
Purge	-0.1052	0.7575*	0.5125*	0.012	0.6709*	0.4881*	0.7965*	-0.3060*	1
Xcons	-0.1166	-0.0334	-0.1748*	-0.0267	-0.049	-0.1143	-0.2723*	-0.1673	-0.2194

* indicates significance at the 10% level

Risk of Revolution

		mean	median	max	min	st.dev.	c.v.
Risk	Germany	0.132	0.074	0.460	0.029	0.119	0.90
	UK	0.112	0.074	0.637	0.029	0.143	1.28
	Belgium	0.065	0.051	0.161	0.029	0.038	0.58
	USA	0.076	0.046	0.262	0.029	0.070	0.93
	France	0.128	0.100	0.404	0.029	0.106	0.83
	Italy	0.056	0.029	0.232	0.029	0.051	0.91
	Netherlands	0.032	0.029	0.043	0.029	0.005	0.16
	Sweden	0.029	0.029	0.037	0.029	0.002	0.06
	Norway	0.030	0.029	0.043	0.029	0.003	0.10
	Switzerland	0.029	0.029	0.033	0.029	0.001	0.03
Risk2	Germany	0.189	0.169	0.491	0.027	0.114	0.60
	UK	0.090	0.056	0.461	0.027	0.116	1.28
	Belgium	0.062	0.045	0.183	0.027	0.043	0.70
	USA	0.059	0.031	0.220	0.027	0.054	0.92
	France	0.119	0.092	0.515	0.027	0.118	0.99
	Italy	0.061	0.039	0.246	0.027	0.054	0.89
	Netherlands	0.029	0.027	0.039	0.027	0.005	0.17
	Sweden	0.028	0.027	0.039	0.027	0.004	0.13
	Norway	0.028	0.027	0.057	0.027	0.007	0.25
	Switzerland	0.027	0.027	0.031	0.027	0.001	0.04
Crisk	Germany	0.180	0.063	0.497	0.030	0.168	0.94
	UK	0.163	0.068	0.997	0.026	0.246	1.51
	Belgium	0.058	0.061	0.098	0.030	0.019	0.33
	USA	0.099	0.050	0.350	0.030	0.098	0.99
	France	0.106	0.073	0.374	0.028	0.090	0.84
	Italy	0.098	0.036	0.556	0.026	0.135	1.38
	Netherlands	0.034	0.032	0.055	0.024	0.009	0.26
	Sweden	0.033	0.032	0.045	0.024	0.007	0.21
	Norway	0.033	0.032	0.045	0.024	0.007	0.21
	Switzerland	0.033	0.030	0.045	0.024	0.007	0.21


no events
one event
two or more events
Density
30
20
10
0
0
.05
.1
.15
standard deviation of monthly returns

Transition probability matrices

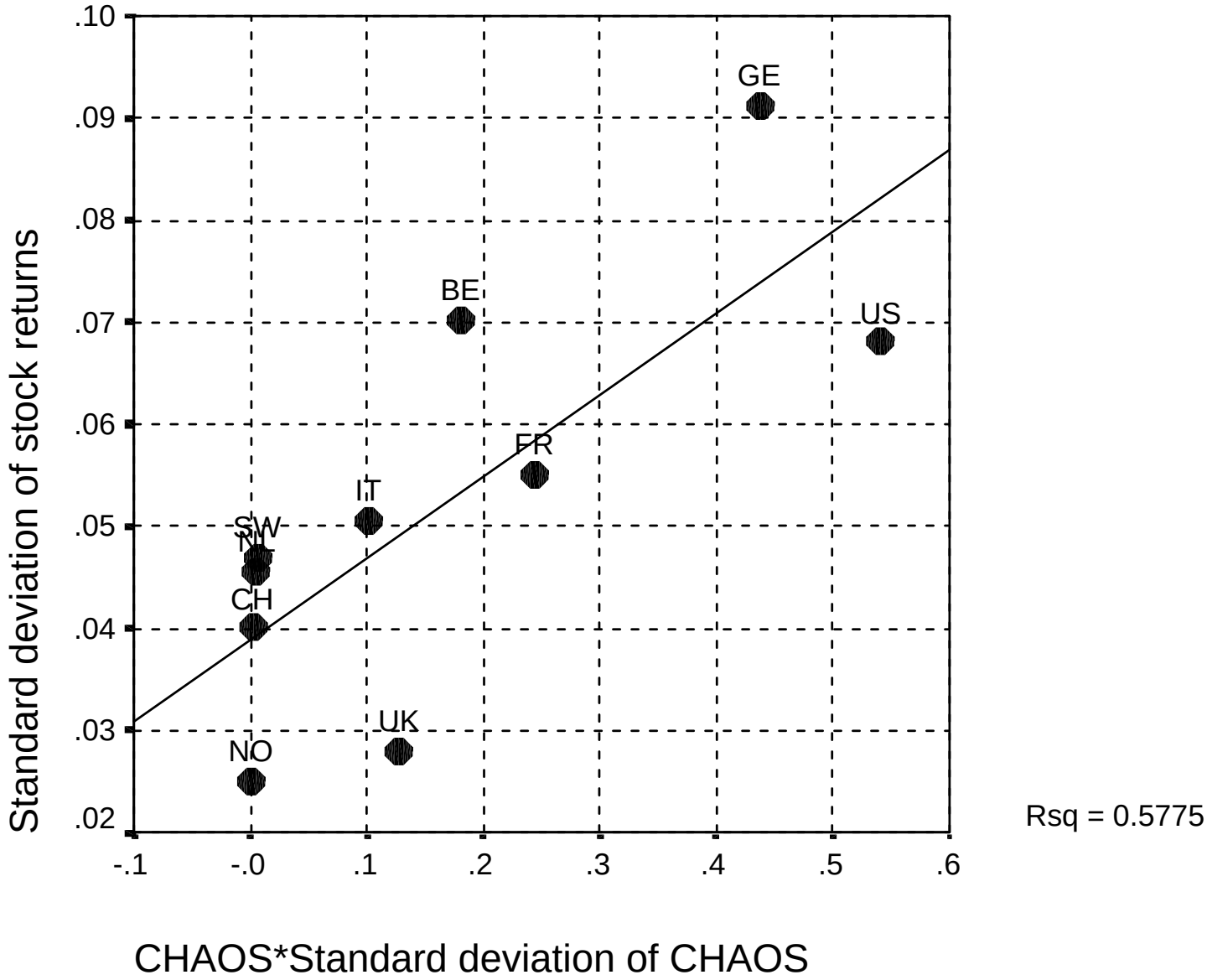
if chaos<2

from	to volatility	low	high	sum
	low	57	13	70
		81%	19%	72%
	high	14	13	27
		52%	48%	28%

if chaos>2

	volatility	low	high	sum
	low	20	7	27
		74%	26%	45%
	high	10	23	33
		30%	70%	55%

Some Cross-sectional Evidence



Unrest and Violent Overthrow of the Government

The table reports results for the regression

$$R_{it} = \alpha_i + \beta_2 P_{it} + \varepsilon_{it}$$

Estimation technique is ordinary least squares and logistic regression. T-statistics (based on White heteroscedasticity-consistent covariances) and Z-scores in parentheses. For data sources, cf. Appendix I. *, **, *** indicate significance at the 10, 5% and 1% level, respectively.

	1	2	3	4
DEMO	0.0048	0.056	0.82	0.65
	(0.12)	(1.4)	(0.4)	(0.32)
PURGE	0.23***	0.18***	4.2***	3.7*
	(5.8)	(4.5)	(3.4)	(2.0)
RIOT	0.014	0.02	2.9***	3.2***
	(0.7)	(1.1)	(3.9)	(2.8)
CRISIS	0.16***	0.14***	3.0***	2.3*
	(5.8)	(4.9)	(2.8)	(1.9)
GUER	0.13***	0.13***	3.0**	5.5***
	(3.1)	(3.3)	(2.4)	(2.5)
STRIKE	0.3***	0.3***	1.44	1.3
	(5.4)	(5.3)	(0.5)	(0.5)
ASSASS	0.23***	0.25***	3.96	3.5
	(4.8)	(5.3)	(1.5)	(1.4)
Fixed Effects	NO	YES	NO	YES
Adj. R^2	0.29	0.29		
LR-CHI^2			37.0	38.8

Baseline results, 5-year periods

Stock prices and civic unrest

The table reports results for the regression

$r_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{it}$ (eq. 1-6) and $\sigma_{it} = \alpha + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{\sigma it}$ (eq. 7-12)

Estimation technique is generalized least squares (GLS). T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses. For data sources, cf. Appendix I. *, **, *** indicate significance at the 10, 5% and 1% level, respectively.

Dependent variable	Log return						Standard deviation of returns					
	1	2	3	4	5	6	7	8	9	10	11	12
DEMO	-0.012*						0.0055***					
	(1.84)						(8.3)					
STRIKE		-0.024						0.0083***				
		(1.5)						(5.8)				
RIOT			-0.007***						0.002***			
			(2.8)						(5.1)			
CHAOS				-0.006***	-0.006***	-0.004*				0.00021***	0.00026**	0.0007***
				(2.9)	(2.8)	(1.8)				(7.3)	(2.3)	(2.8)
GROWTH						1.9***						-0.02
						(14.8)						(2.19
INF						5.6e-11*						1.8e-10***
						(1.9)						(31.1)
Fixed effects	N	N	N	N	Y	Y	N	N	N	N	Y	Y
adj. R^2	0.03	0.03	0.029	0.011	0.32	0.29	0.17	0.17	0.19	0.17	0.32	0.37
N	484	479	479	484	484	343	511	511	511	511	511	356

Stock Prices and Civic Unrest – Robustness

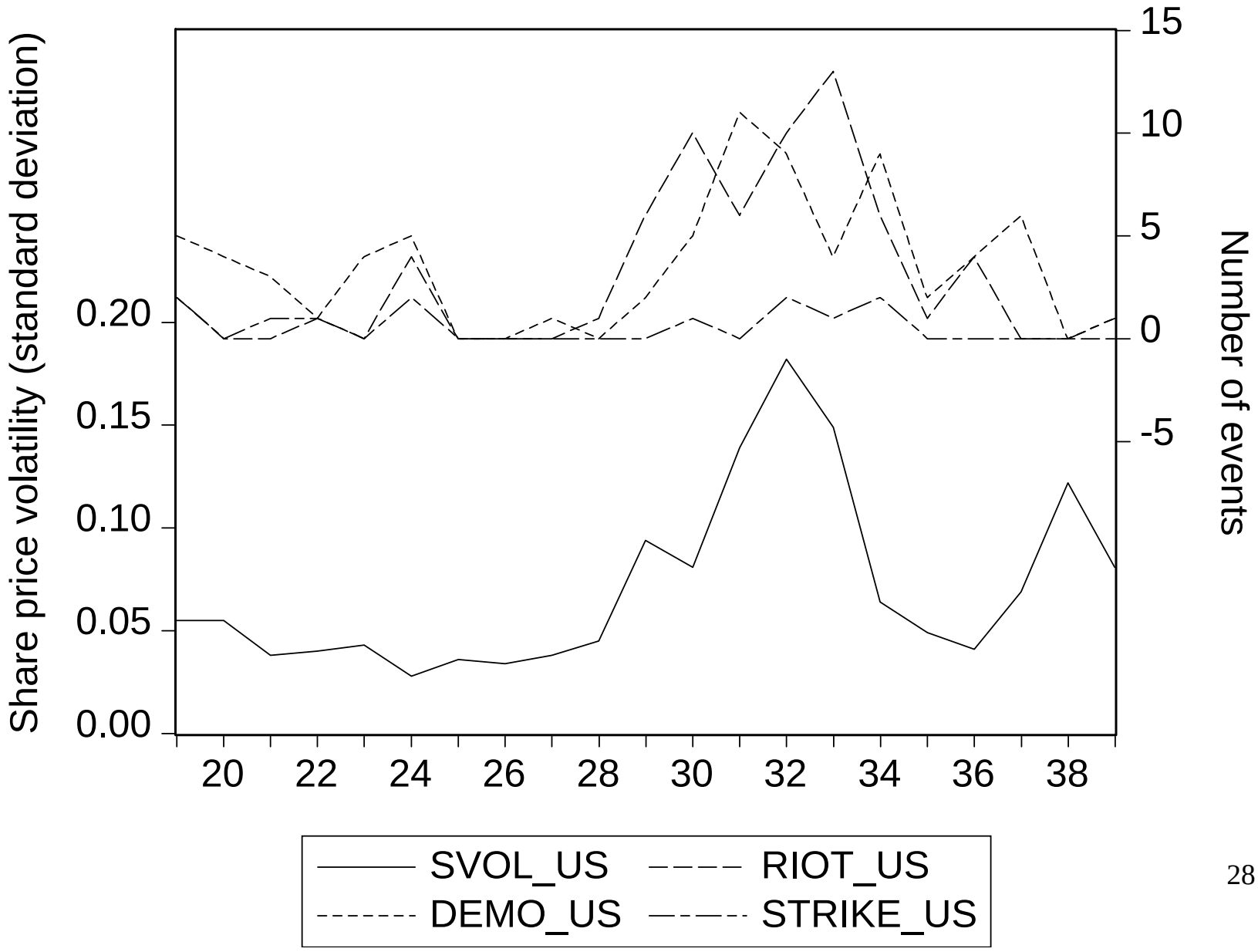
The table reports results for the regressions

$r_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{it}$ (eq. 1-6) and $\sigma_{it} = \alpha + \beta_1 X_{it} + \beta_2 \pi_{it} + \varepsilon_{\sigma it}$ (eq. 7-12)

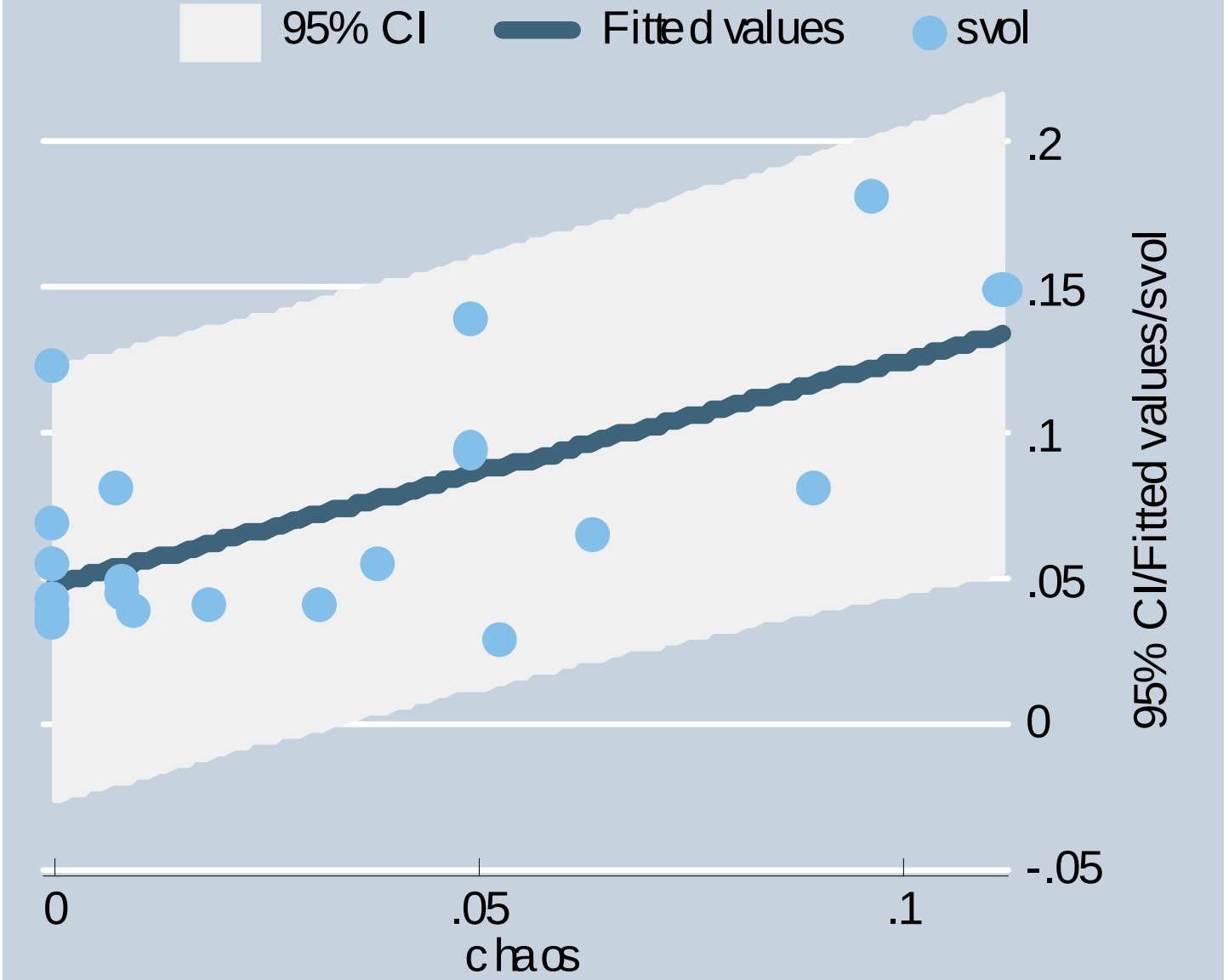
T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses. For data sources, cf. Appendix I. *, **, *** indicate significance at the 10, 5% and 1% level, respectively.

Dependent variable	Log return				Standard deviation of returns			
Estimation method	GLS	GLS	GLS	Median regression	GLS	GLS	GLS	Median regression
	1	2	3	4	5	6	7	8
Log return(-1)		0.11*						
		(2.1)						
St.dev.(-1)						0.31***		
						(5.8)		
CHAOS	-0.0047*		-0.009***	-0.008***	0.0009*		0.002***	0.001*
	(2.1)		(4.6)	(2.7)	(2.1)		(4.4)	(1.9)
GROWTH	1.78		2.3***	0.94***	-0.015		-0.05***	-0.6**
	(12.1)		(19.7)	(6.0)	(1.2)		(4.6)	(2.4)
INFL	-0.12		0.12	2.4e-10	-0.017*		-0.015	1.9e-10***
	(0.8)		(1.2)	(9.9)	(2.3)		(1.5)	(46.7)
Chaos(0 to –2)		-0.01***				0.0008***		
		(3.1)				(3.2)		
Growth(0 to –2)		0.013				-0.0002		
		(4.6)				(1.3)		
Inf(0 to –2)		0.003				0.0005**		
		(0.95)				(2.4)		
Fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
adj. R^2	0.28	0.1	0.48	0.08	0.29	0.74	0.33	0.44
N	309	308	221	354	321	315	227	366

The Case of the US



Volatility and Unrest in the US



EBA

- Use of 9 exogenous variables
- All possible combinations
- 256 regressions [means and volatilities]
- 90% significance for returns
- 95% significance for st.dev.

Stock Prices and Civic Unrest – IV estimates

The table reports results for the regressions

$$r_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \hat{\pi}_{it} + \varepsilon_{it} \text{ and } \sigma_{it} = \alpha_i + \beta_1 X_{it} + \beta_2 \hat{\pi}_{it} + \varepsilon_{it}$$

where $\hat{\pi}$ is the instrumented value of unrest. Estimation technique is generalized least squares (GLS).
T-statistics (based on White heteroscedasticity-consistent covariances) in parentheses.
For data sources, cf. Appendix I.
*, **, *** indicate significance at the 10, 5% and 1% level, respectively.

Dependent variable	Log return			Standard deviation of returns		
	1	2	3	4	5	6
CHAOS	-0.05*	-0.054*	-0.0036	0.0085*	0.008*	0.008***
	(1.7)	(1.7)	(0.3)	(1.95)	(2.0)	(2.7)
GROWTH	0.04	0.04	0.68**	-0.22	-0.21	-0.06
	(0.08)	(0.08)	(2.4)	(0.3)	(0.3)	(0.8)
INF	1.5e-10	1.47e-10	2.5e-10*	1.8e-10***	1.8e-10***	1.7e-10***
	(0.9)	(0.89)	(1.9)	(8.0)	(8.02)	(4.4)
CHAOS instrumented by	Votes Travel Sign Fraction Urban	PC_{com}^{+} Fraction Urban	PC_{com}^{+}	Votes Travel Sign Fraction Urban	PC_{com}^{+} Fraction Urban	PC_{com}^{+}
Fixed effects	Y	Y	N	Y	Y	N
Adj. R^2	0.31	0.32	0.02	0.73	0.72	0.05

Note: $^{+}$ first factor from principal components analysis of Votes, Travel, and Sign

Exogeneity and the impact of initial instability – Wolfers/Blanchard methodology

$$\sigma_{it} = c_i + d_t(1+\sum_j \beta_j I_{ij}) + d_t(1+\sum_j \gamma_j X_{ijt}) + e_{it}$$

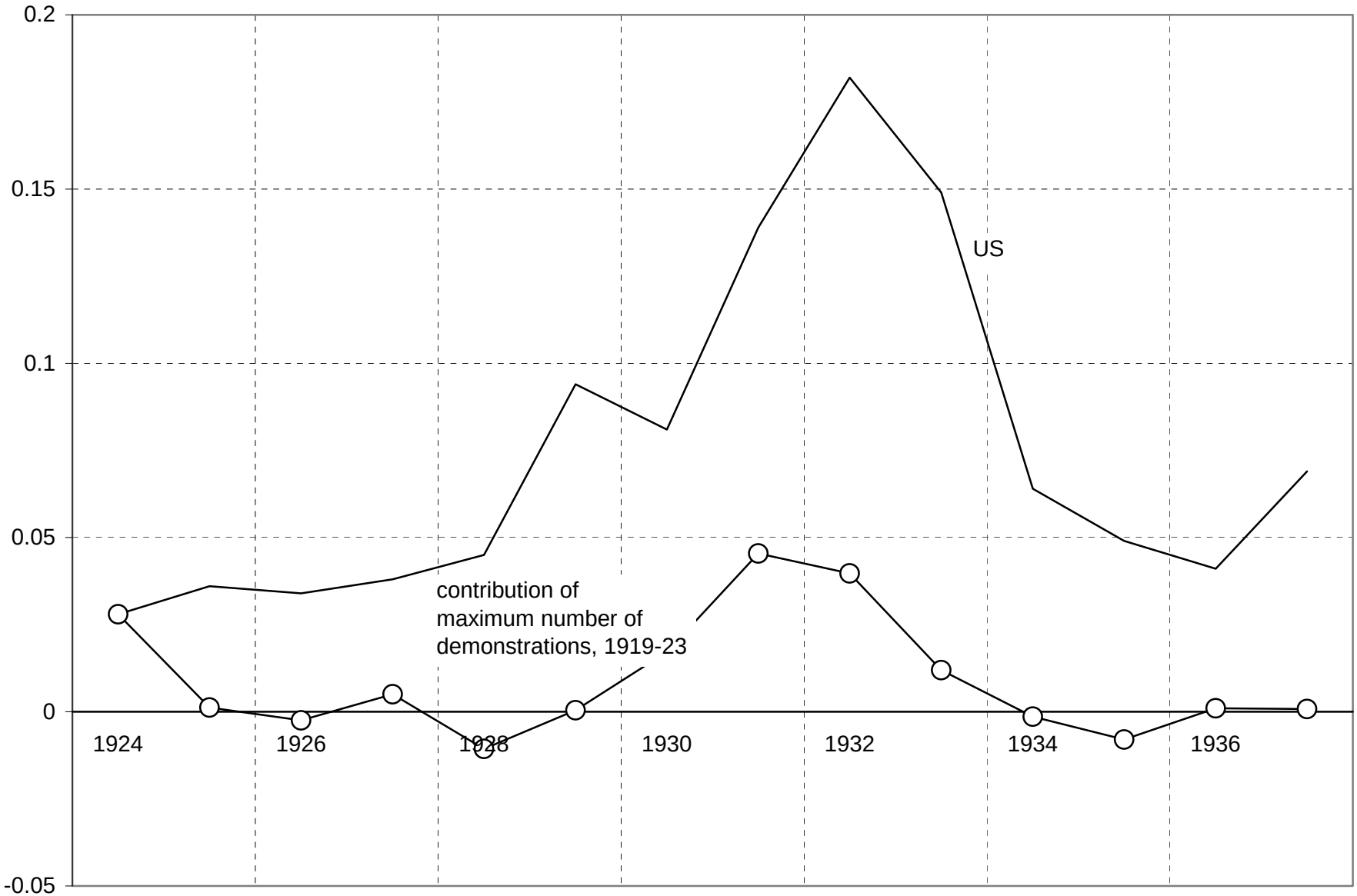
Where c is a country-specific intercept, d is a year dummy, I is a measure of instability during the period 1919-23, X is growth.

Estimation is for 1924-39

Stock Price Volatility and Unobserved Shocks

For data sources, cf. Appendix I. *, ** indicate significance at the 10, 5% and 1% level, respectively.

		1	2	3	4
D1932		0.028	0.031	0.025	0.037
ICrises		0.074			
		(1.6)			
IDemo			0.088*		0.11*
			(1.95)		(1.85)
IRiot				0.13	
				(1.65)	
Growth					-2.84*
					(1.7)
Adj. R^2		0.75	0.74	0.73	0.81
Instability					
	Max	13	17	39	17
	Min	0	0	0	0
Impact					
	Max	0.027	0.046	0.13	0.069
	Min	0	0	0	0
Observed					
	Std. dev.	0.059	0.059	0.059	0.059
	Fixed effects	YES	YES	YES	YES
	Time effects	YES	YES	YES	YES


0.2
0.15
0.1
0.05
0
-0.05
US
contribution of
maximum number of
demonstrations, 1919-23
1924
1926
1928
1930
1932
1934
1936

Bottom line and further issues

- Political fragility and chaos have a significant effect on volatility, but explain only a relatively modest fraction of the total variation
  - How plausible is the idea that the indicators of instability measure the same underlying phenomenon in different countries and over time? Not very → lower bound of true effect (cf. Chaos in the US in the 1960s)
  - Inflation volatility is highly significant – may reflect the difficulty of disentangling the two, since politically weak countries also are more likely to experience high rates of inflation (which correlates with higly variable inflation)
  - Non-linearites in the data – risk of major discontinuity probably increases exponentially with number of „events“ (limited empirical support so far)
  - Use of synchronicity measure (Morck et al.) will help to pin down causal mechanism

Future work

- If shifts in the probability of „disaster“ ever mattered, they should have done so in the 1962 Cuban missile crisis – apply similar approach, using Nato membership/distance from Warsaw Pact border/troop densities to analyse changes in stock prices and in volatility
- Using the perceived „risk of revolution“ indicator to explain output – connect with potential supply shifts during the 1930s (Cole, Ohanian and Leung 2002)
- Use volatility as a market-based indicator of perceived radicalism – when do parties present a serious challenge to the established order, in the eyes of capitalists?