

What Triggers Stock Market Jumps?

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Summer 2018



Topical – four +/-2.5% daily jumps this year

DOW JONES, A NEWS CORP COMPANY

DJIA 24190.90 1.38% ▲

S&P 500 2619.55 1.49% ▲

Nasdaq 6874.49 1.44% ▲

U.S. 10 Yr 0/32 Yield 2.854% ▼

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U.S. MARKETS

Dow Drops More Than 1,100 Points in Stock-Market Rout

Blue chips post biggest one-session point decline on record as indexes around the world give up 2018 gains

By Akane Otani

February 5, 2018

- Dow industrials post largest-ever point decline
- Stock indexes around the world erase 2018 gains
- Traders describe a sense of anxiety as Dow tumbled

The long
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and Asia

Traders
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Trade Deal Hurdle
Struggles as Broadness

MARKETS
U.S. Government Bonds
Dread Winter Slump of
Season

MARKETS | U.S. MARKETS

U.S. Stocks Sell Off on Concerns About Trade

Dow tumbles more than 700 points, pulled down by shares of manufacturers and banks

Dow Jones Industrial Average



Source: WSJ Market Data Group

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Not Just Trade: Interest
Rates Are Also Dragging
China's Yuan Down



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Resign Confidant Paul
Laxalt Served Nevada as
Governor, Senator

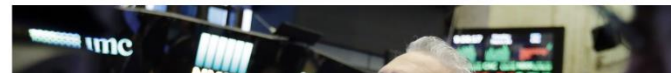


MARKETS
U.S. Shares
Ahead of
Tariffs

MARKETS

Stocks Rebound as Trade Tensions With China Ease

Dow industrials soar in largest daily point gain since the financial crisis as threat of rising rates lingers



Recommended Videos

1. What's the Real Goal
Behind Trump's Iran

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U.S. MARKETS

Dow Industrials Plunge Into Correction

Blue-chip index falls more than 1,000 points and is now down more than 10% from its January high

By Akane Otani and Jon Sindreu

Updated Feb. 8, 2018 4:33 p.m. ET

The Dow Jones Industrial Average and S&P 500 entered correction territory for the first time in two years on Thursday as worries about rising interest rates and newfound volatility continued to rattle the markets.

The Dow hadn't been in a correction—a decline of at least 10% from a recent high—since February 2016. And traders were bracing for more upheaval.

“We opened around the highest levels of the day and closed at the lows, and that's telling us the sellers aren't quite done yet,” said Jonathan Corpina, senior managing partner at broker-dealer Meridian Equity Partners.

Stocks spent much of the session Thursday deep in the red as a shaky day in the bond market appeared to spill over into equities. But stocks' losses escalated near the end of the trading day, with the blue-chip index falling more than 400 points in the final 30 minutes of the session.

The Dow ended down 1,032.89 points, or 4.1%, to 23860.46. The plunge marks the second-steepest point decline on record, after Monday's 1,175.21-point swoon. In percentage terms, however, neither drop ranks among the 100 biggest one-day plunges on record.

But *why* does the stock market jump?

- Two broad views on stock moves:
 - Eugene Fama: driven by discount rates, cash flows
 - Robert Shiller: behavioral and hard to explain



THE ANALYSIS OF WORLD EVENTS AND STOCK PRICES*

VICTOR NIEDERHOFFER†

INTRODUCTION AND SUMMARY

The research reported below has two major objectives. The first is to examine in a scientific fashion certain broad relations between world events and movements in stock prices. The second is to illustrate and suggest specific applications of some techniques for measuring meaning that have not previously been used to any great extent in business research.

World events were defined as occurring in this study when a five- to eight-column headline occurred in the *New York Times*. The quantitative attributes of headlines—the size, the ready availability of a historical series, their reliability, and other factors—make them an appropriate source for this study.

sult is that bad headlines tend to follow bad headlines and good headlines tend to be followed by good headlines. There are also some noteworthy seasonal properties to the headline series.

The most unequivocal pattern of influence reported below is that large changes are substantially more likely following world events than on randomly selected days. For clusters of world events, such as those occurring on crises, the proportion of large changes is substantially greater than the proportion following relatively isolated world events.

Contrary to popular belief, the particular category into which a world event falls does not appear to add much additional information concerning future price movements.

Cutler, Poterba and Summers (JPM, 1988)

March 1988

What Moves Stock Prices?

Abstract

This paper estimates the fraction of the variance in aggregate stock returns that can be attributed to various kinds of news. First, we consider macro-economic news and show that it is difficult to explain more than one third of the return variance from this source. Second, to explore the possibility that the stock market responds to information that is omitted from our specifications, we also examine market moves coincident with major political and world events. The relatively small market responses to such news, along with evidence that large market moves often occur on days without any identifiable major news releases, casts doubt on the view that stock price movements are fully explicable by news about future cash flows and discount rates.

This paper analyzes jumps on a large scale

Study newspapers day after over 5000 +/- 2.5% jumps across 15 countries back to 1980 (1900 if possible) with 28 person RA team

Main findings:

- Policy is important: 36% US jumps attributed to policy (and 41% internationally)
- Policy Jumps and Volatility: Realized volatility is lower following policy-driven jumps, relative to other jumps
- US dominates globally: Outside US, newspapers attribute 34% of jumps to US – above 11% US GDP share – and this share is rising
- Clarity Matters: Volatility and trading volume are lower after jumps with clearer explanations

Outline

Data: Drivers of Stock Market Jumps

US Results: Types of Jumps

US Results: Implications of Different Jumps

International Results

Categorizing Jumps

- US jump definition: Days where the CRSP Value-Weighted Index has an absolute return of at least 2.5%
- Use the following day's newspaper to categorize jumps
- To maximize accuracy:
 - Five papers read each day
 - Each newspaper is read by 2 RAs
 - Differences within and across papers discussed
 - Created 136 page audit guide and RA training program

Why use human coders?

- Economics Knowledge
- Language variation
- Topic Variation
- Nuances

Example 1 (3/26/18, 2.72%): Intl. Trade Policy

U.S. Stocks Surge as Trade Worries Ease

The Dow industrials, after its worst week in more than two years, records its biggest one-day point gain in about a decade

U.S. stocks staged a powerful rebound on Monday, surging on signs that recent trade tensions were easing as the Dow Jones Industrial Average notched its third biggest point-gain ever.

Investor fears that escalating trade tensions could eventually lead to a trade war eased after reports of renewed discussions between the two countries. The Wall Street Journal reported Sunday that [China and the U.S. have started negotiating](#) to improve U.S. access to mainland Chinese markets. U.S. Treasury Secretary Steven Mnuchin on Sunday said the administration was “working on a pathway to see if we can reach an agreement as to what fair trade is for them.”

This article would receive a primary category of **International Trade Policy** because the article links the rise to the reports of progress in the US-China trade talks. Geographic source would be the **US** and **China**. Journalist confidence would be **High**, as the article explicitly links the move to the trade talks. Ease of coding would be **Easy**.

Example 2 (9/29/08, -8.7%): Gov. Spending

THE WALL STREET JOURNAL.

Bailout Plan Rejected, Markets Plunge, Forcing New Scramble to Solve Crisis

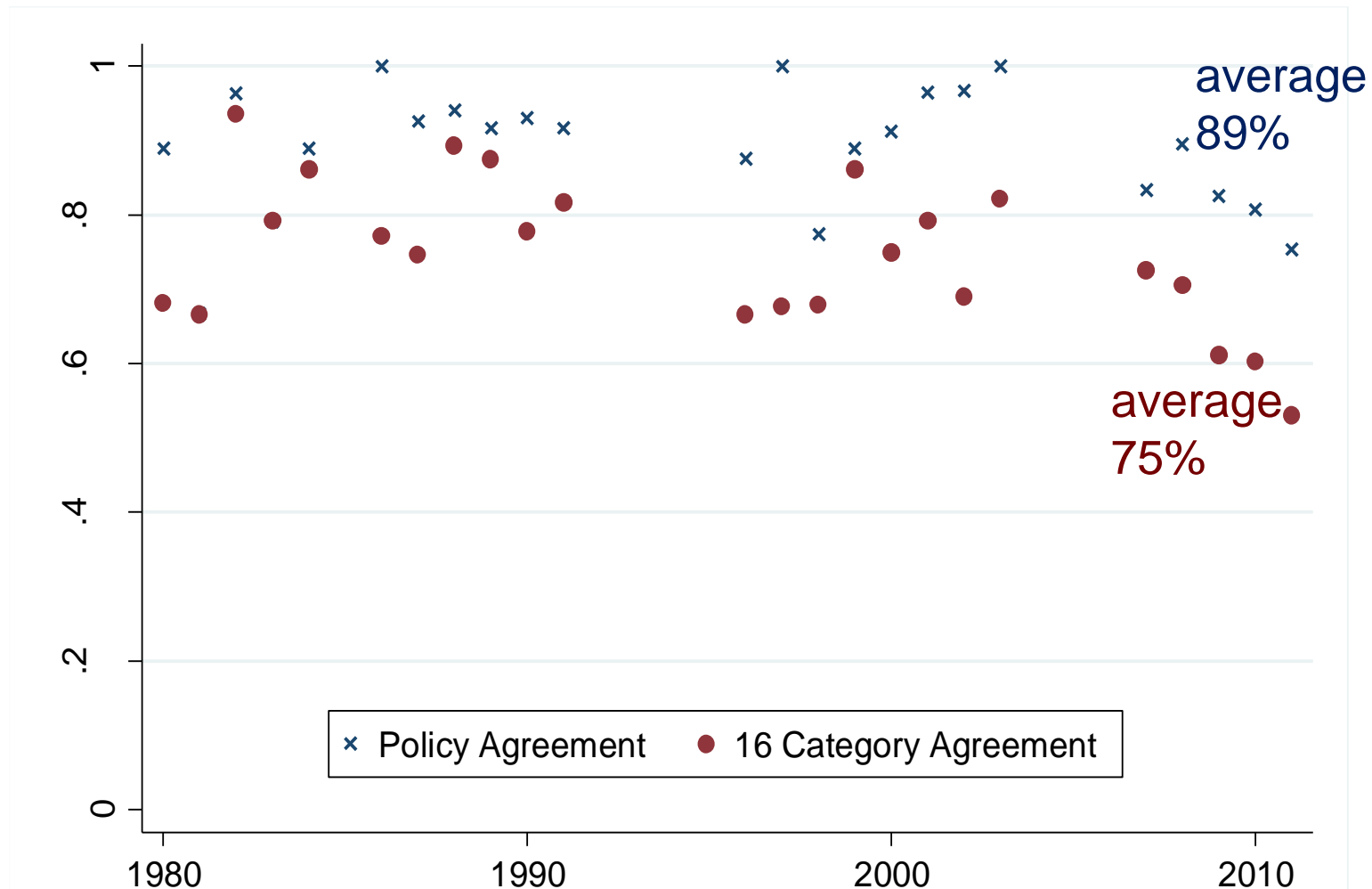
WASHINGTON – The House of Representatives defeated the White House’s historic \$700 billion financial-rescue package – a stunning turn of events that sent the stock market into a tailspin and added to concerns that the U.S. faces a prolonged recession if the legislation isn’t revived.

This article is coded as **Government Spending (Policy)** because the first reason listed for the stock market plunge is the rejection of the government’s bailout plan. The bailout plan itself involves the government spending money to help the economy, and even though it is a rejection of the plan, it is still coded as government spending. Geographic source would be the **US**. Confidence and ease of coding **High** and **Easy**.

How reliable are these jump codings?

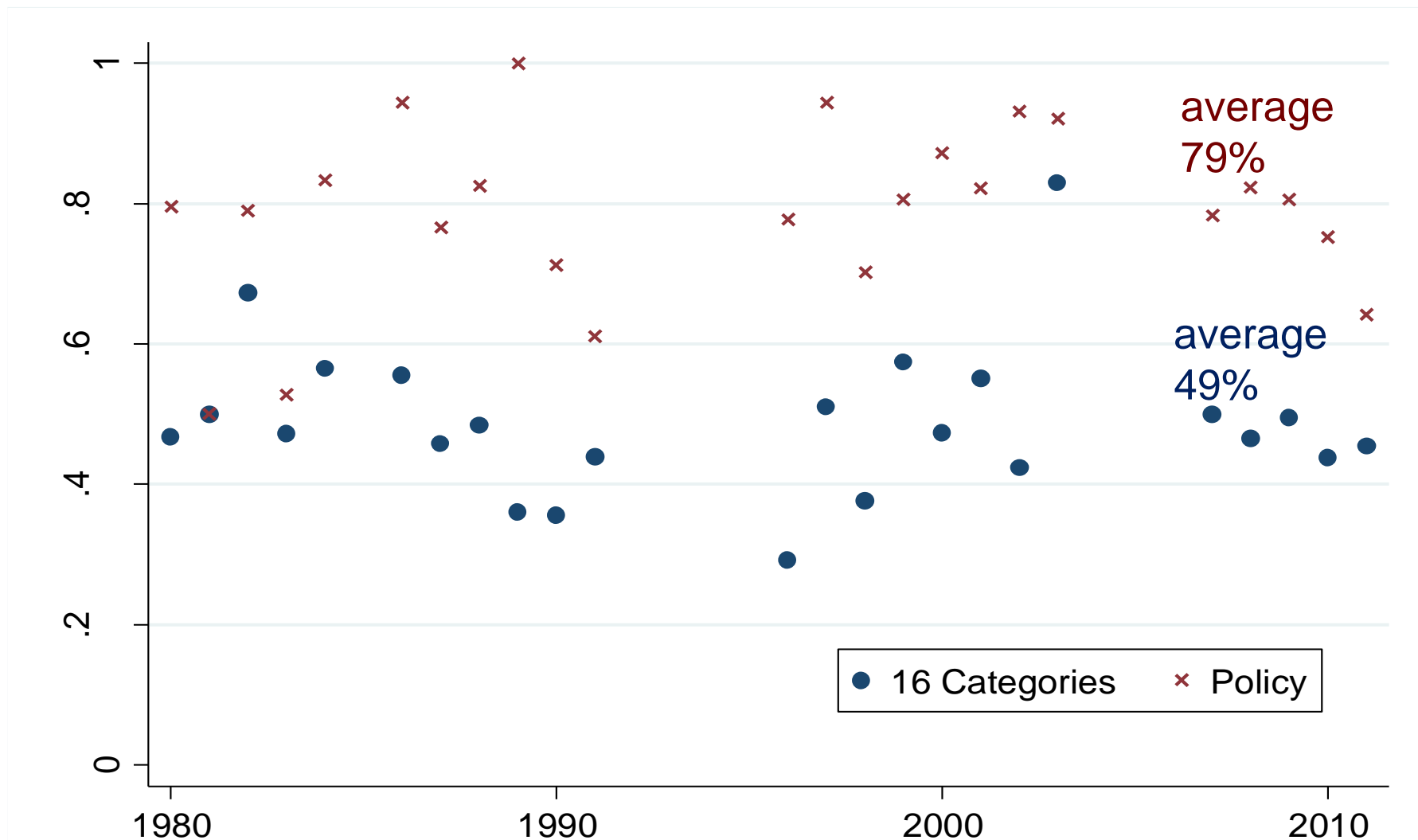
- Two potential concerns about the method:
 - RAs reading same paper may code jumps differently
 - Results may depend on the newspaper consulted
- To evaluate these concerns we:
 - Use multiple RAs for same paper - calculate within-paper agreement
 - Use multiple papers - Boston Globe, LA Times, NY Times, WSJ, Washington Post - calculate across-paper agreement

Test 1: Agreement Within Paper



Notes: For each coder, we compute agreement with all coders who read the same newspaper. Agreement is the share of pairs that agree, averages are shown for each year.

Test 2: Agreement Across Papers



Notes: For each coder, we compute agreement with every coder who read an article from another paper. Agreement is the share of pairs that agree, averages are shown for each year.

Additional Validation Exercises

- Industry Responses to Jumps:
 - Ex: Banks to bailouts and Defense to wars
- Codings Reflect Information Releases:
 - Monetary Policy is more likely on FOMC dates
 - Macro more likely on Employment Situation Report and the CPI Report release dates
 - Elections more likely the day after national elections

Outline

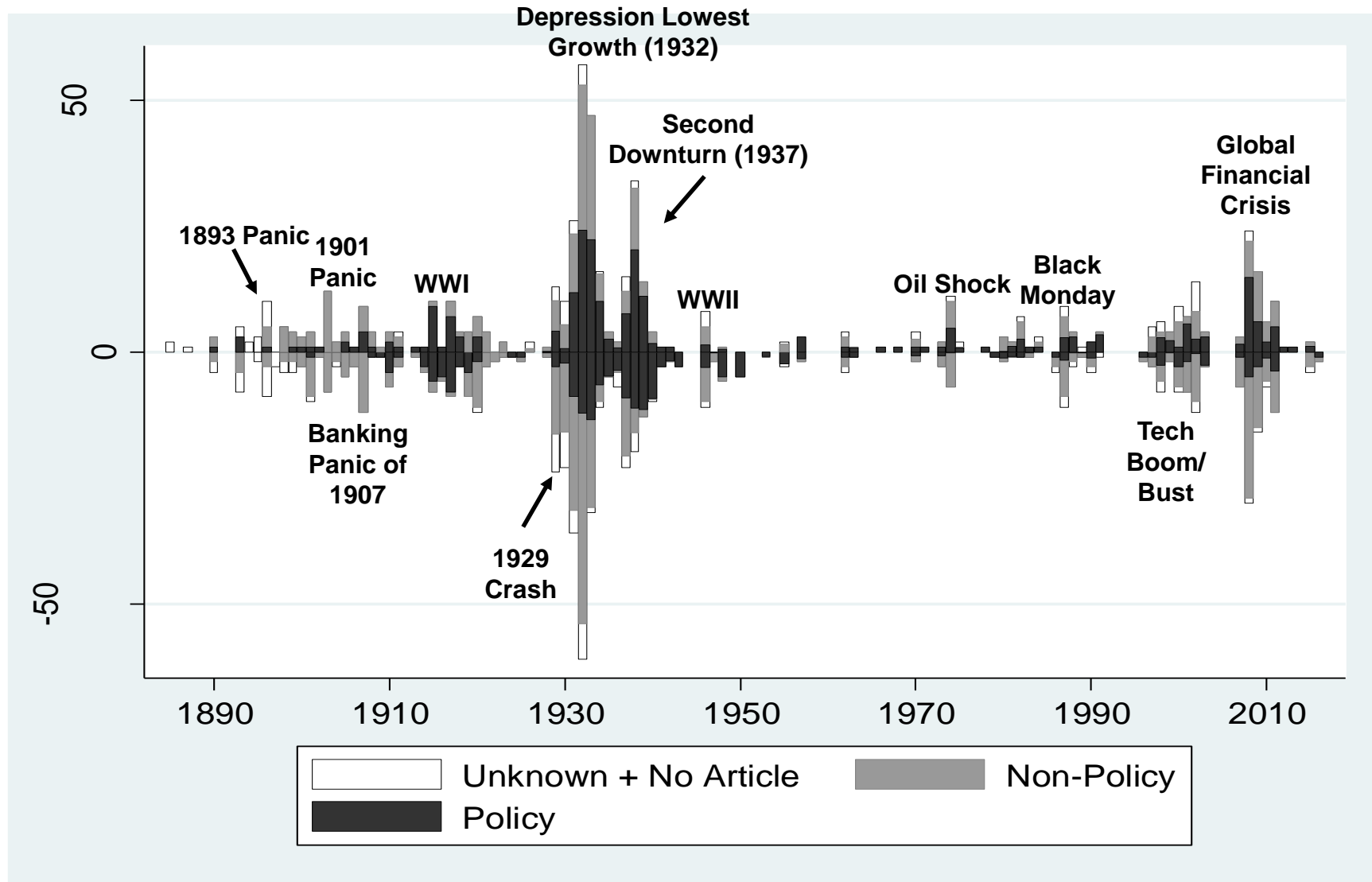
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US Jumps by Year



Notes: Each bar shows the number of positive or negative jumps in the year. Shadings indicate the number of jumps triggered by “Policy” and “Non-Policy” news. The residual category reflects jumps attributed to unknown causes by the newspaper article and instances in which we could not identify an article that discusses the jump (this only occurs for jumps occurring prior to 1926).

Drivers of Biggest Losses by Era

	Years	# of jumps	10 Biggest Daily Drops	
			Most Common	2nd Most
Pre-Fed Era	1900-13	100	Unknown	Regulation
World War I	1914-19	63	Sov. Military	Non-Sov. Military
1920s	1920-28	32	Unknown	Macro. News
Depression Era	1929-38	466	Unknown	Commodities
World War II	1939-45	51	Sov. Military	Monetary Policy
Early Postwar	1946-72	63	Elections	Macro. News
Inflation & Oil shocks	1973-79	27	Macro. News	Commodities
Disinflation & Growth	1980-94	65	Macro. News	Unknown
Boom, Rec. & Recovery	1995-2006	95	Macro. News	Monetary Policy
Global Financial Crisis	2007-10	109	Macro. News	Corp. Earnings
Post GFC	2011-18	37	Macro. News	Elections
All Periods	1900-2018	1108	Macro. News	Unknown

Notes: We identify the 10 biggest stock market losses in each era. Numbers in parenthesis denote the number of codings attributed to the modal categories among the largest positive and negative moves. Each day has between 2 and 11 coders, so fractional numbers are the result of disagreement. For example, if there are two coders on a given day, and one codes Gov. Spending while the other codes Taxes, that will count as $\frac{1}{2}$ a jump for each category. Coders are given equal weight within a day, and days are given equal weight within the sample.

Drivers of Biggest Gains by Era

	Years	# of jumps	10 Biggest Daily Gains	
			Most Common	2nd Most
Pre-Fed Era	1900-13	100	Unknown	Macro. News
World War I	1914-19	63	Macro. News	Sov. Military
1920s	1920-28	32	Unknown	Macro. News
Depression Era	1929-38	466	Macro. News	Other Policy
World War II	1939-45	51	Sov. Military	Macro. News
Early Postwar	1946-72	63	Macro. News	Unknown
Inflation & Oil shocks	1973-79	27	Monetary Policy	Macro. News
Disinflation & Growth	1980-94	65	Macro. News	Monetary Policy
Boom, Rec. & Recovery	1995-2006	95	Unknown	Corp. Earnings
Global Financial Crisis	2007-10	109	Gov. Spending	Macro. News
Post GFC	2011-18	37	Macro. News	Gov. Spending
All Periods	1900-2018	1108	Macro. News	Gov. Spending

Notes: We identify the 10 biggest stock market gains in each era. Numbers in parenthesis denote the number of codings attributed to the modal categories among the largest positive and negative moves. Each day has between 2 and 11 coders, so fractional numbers are the result of disagreement. For example, if there are two coders on a given day, and one codes Gov. Spending while the other codes Taxes, that will count as $\frac{1}{2}$ a jump for each category. Coders are given equal weight within a day, and days are given equal weight within the sample.

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Different Types of Jumps Have Different Implications for Post-Jump Behavior

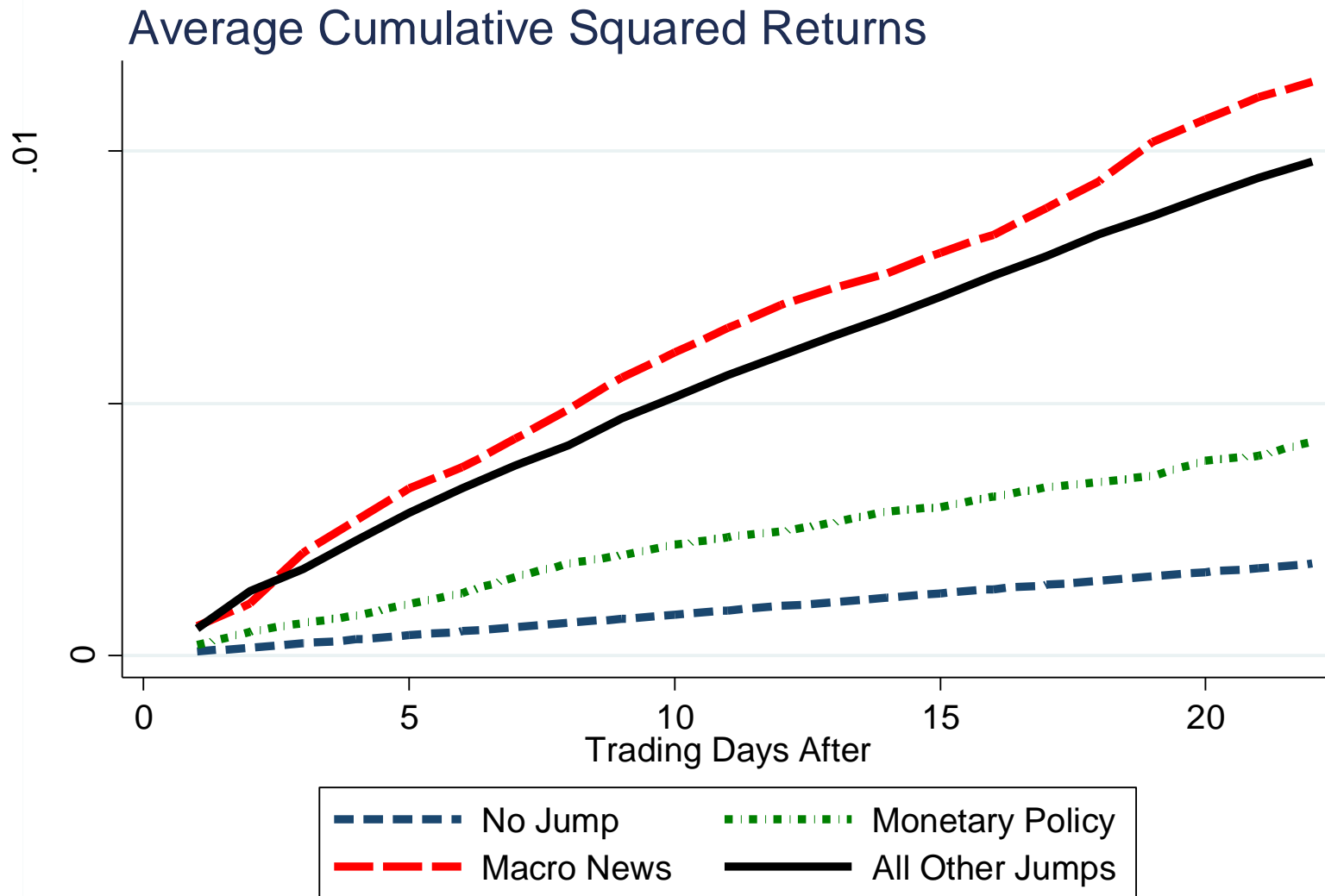
- Some jumps are caused by an injection of uncertainty (3/22/2018, -2.52%)

Investors had widely brushed off concerns about trade and rising interest rates until earlier this year. But signs that interest rates will rise more quickly than expected, along with the Trump administration's aggressive push to narrow the U.S. trade deficit, drove a resurgence in volatility and renewed worries among investors that the nine-year bull market is losing its momentum.

- Other jumps are the result of a resolution of uncertainty (9/16/1901, +4.1%)

Even from the outset it was evident that there was a very marked restoration of confidence in the market with several important reasons to justify it. President Roosevelt's declared intention to maintain the policy of his predecessor, the settlement of

Jumps Attributed to Monetary Policy Have Less Post-Jump Volatility



Notes: Each line represents the average cumulative squared returns after a jump of each type. Sample: Daily data from 1900-2016.

Policy Precedes Lower Volatility

		22-Day Realized Vol.		
		(1)	(2)	(3)
	Policy	0.41*** (0.060)	0.00 (0.060)	
	Non-Policy	0.78*** (0.056)	0.37*** (0.056)	
	Commodities			0.52** (0.210)
Non-Policy	Corporate Earnings			0.13 (0.142)
	Macro News			0.59*** (0.119)
Policy	Monetary Policy			-0.22*** (0.084)
	Fiscal Policy			0.59*** (0.198)
	Military			-0.34*** (0.061)
Obs		31,780	31,780	31,780
R-Squared		0.245	0.272	0.278
Return Controls		NO	YES	YES
Decade Dummies		YES	YES	YES
F-Test, Policy vs. Non-Policy		5.92E-05	2E-05	

Table Notes: Columns 1-3 represent regressions, where the left-hand-side is the sum of squared returns in the 22 days following the jump, multiplied by 100. US data, 1900-2016. *St. Dev. of LHS is 0.506.*

Robust standard errors in parenthesis.

*** p<0.01, ** p<0.05,

* p<0.1

Why we care about clarity

- Categories matter for future volatility, but we are also interested in how 'clear' the jump attribution is.
 - High clarity – Fama-type event

Heavy selling was precipitated by the action of the Federal Reserve Bank of Boston in advancing its rediscount rate to 4% from 3½%.

- Low clarity – Shiller-type event

There was nothing in the day's industrial and business news to account for the severe drop, and Wall street generally regarded it as due to an acute case of nerves. Steel produc-

Measuring Perceived Jump Clarity

We measure Jump Clarity by taking the first principal component of five measures for each jump:

1. Pairwise agreement rate within newspaper
2. Pairwise agreement rate across newspapers
3. Average journalist confidence about jump reason
4. Average ease of coding the jump
5. Share of “Unknown & No Explanation” codings

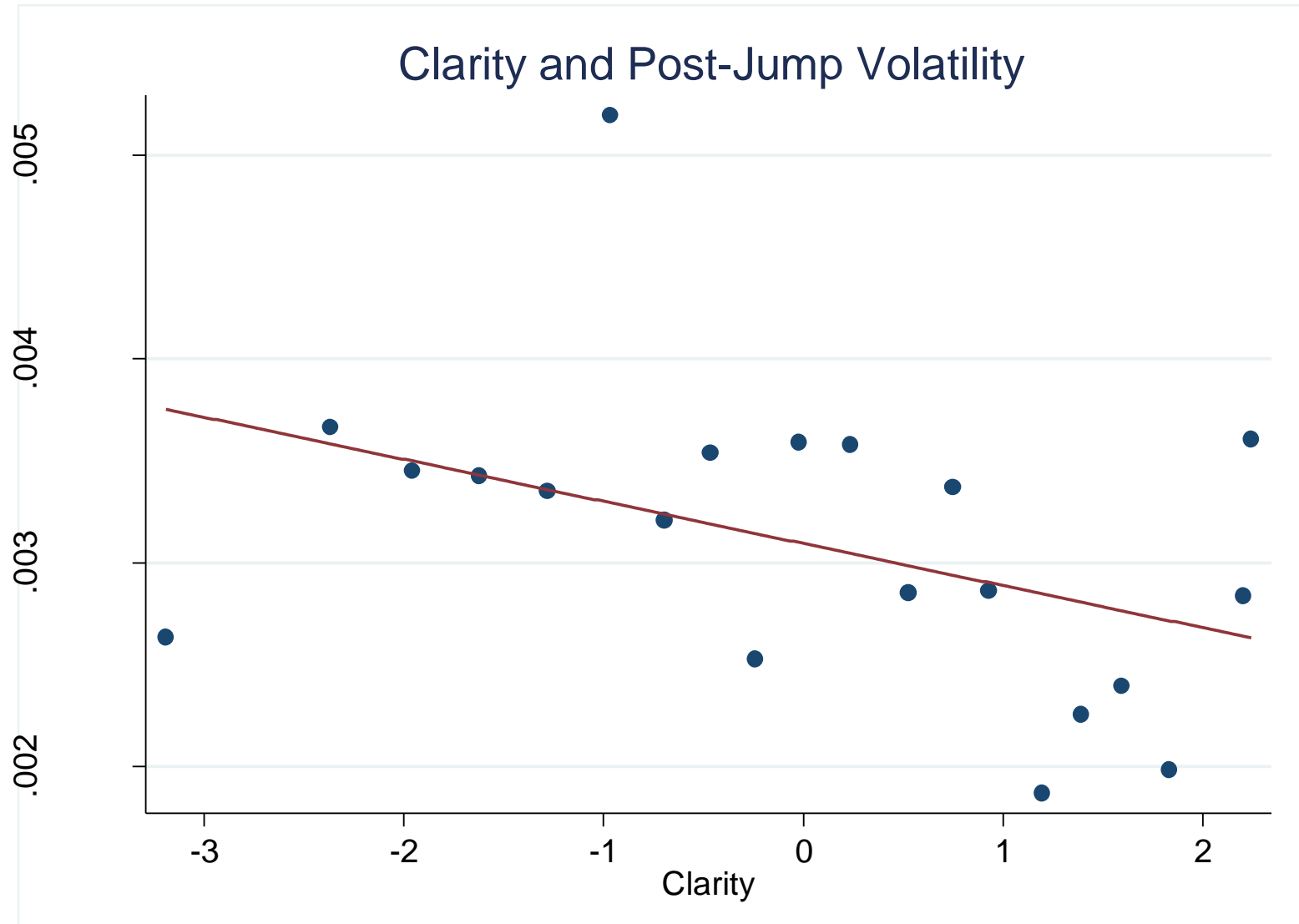
Clear moves associated with lower volatility and volume [Jump Day]

	Volatility	Volume	Concentration	Change in VIX
Clarity [First PC]	-0.58*** (0.18)	-0.20*** (0.06)	0.26*** (0.08)	-0.16* (0.09)
Observations	235	224	235	223
R-squared	0.558	0.854	0.31	0.728
Return Controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Day of the Week FE	YES	YES	YES	YES
Implied Elasticity	-0.681	-0.235	0.302	-0.187

Clarity is the first principal component of: ease of coding, confidence, share of coders who agree (within/across papers) and share of “Unknown” codings

Volatility: sum of squared 5-min returns in S&P 500 index from TickData. Volume: # of SPY shares traded. Concentration: share of the day’s total return that occurred in the 5-min window with the largest absolute return. Change in VIX: close to close. Sample: US data, 1996-2011.

Clear moves associated with lower future volatility



Clarity is the first principal component of: ease of coding, confidence, share of coders who agree and share of “Unknown” codings. US data, 1900-2016
Realized volatility is the sum of squared daily returns over the next 5 days

Volatility is lower after jumps with higher clarity explanations

	Realized Volatility Next Five Days				
	(1)	(2)	(3)	(4)	(5)
Clarity	-5.92*** (2.05)				
Avg. Ease of Coding		-8.88*** (2.95)			
Avg. Confidence			-5.48* (2.97)		
Share Unknown				8.39*** (3.20)	
Pairwise Agreement					-2.79 (2.82)
Observations	1,108	1,108	1,108	1,108	1,108
R-squared	0.183	0.183	0.179	0.183	0.178
Return Controls	YES	YES	YES	YES	YES
Decade Dummies	YES	YES	YES	YES	YES
Implied Elasticity	-0.14	-0.13	-0.09	0.08	-0.06

Table Notes: Columns 1-3 represent regressions, where the left-hand-side is the sum of squared returns over the 5 days following the jump. US data, 1900-2016. Robust standard errors in parenthesis. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Clarity is the first principal component of: ease of coding, confidence, share of coders who agree and share of “Unknown” codings.

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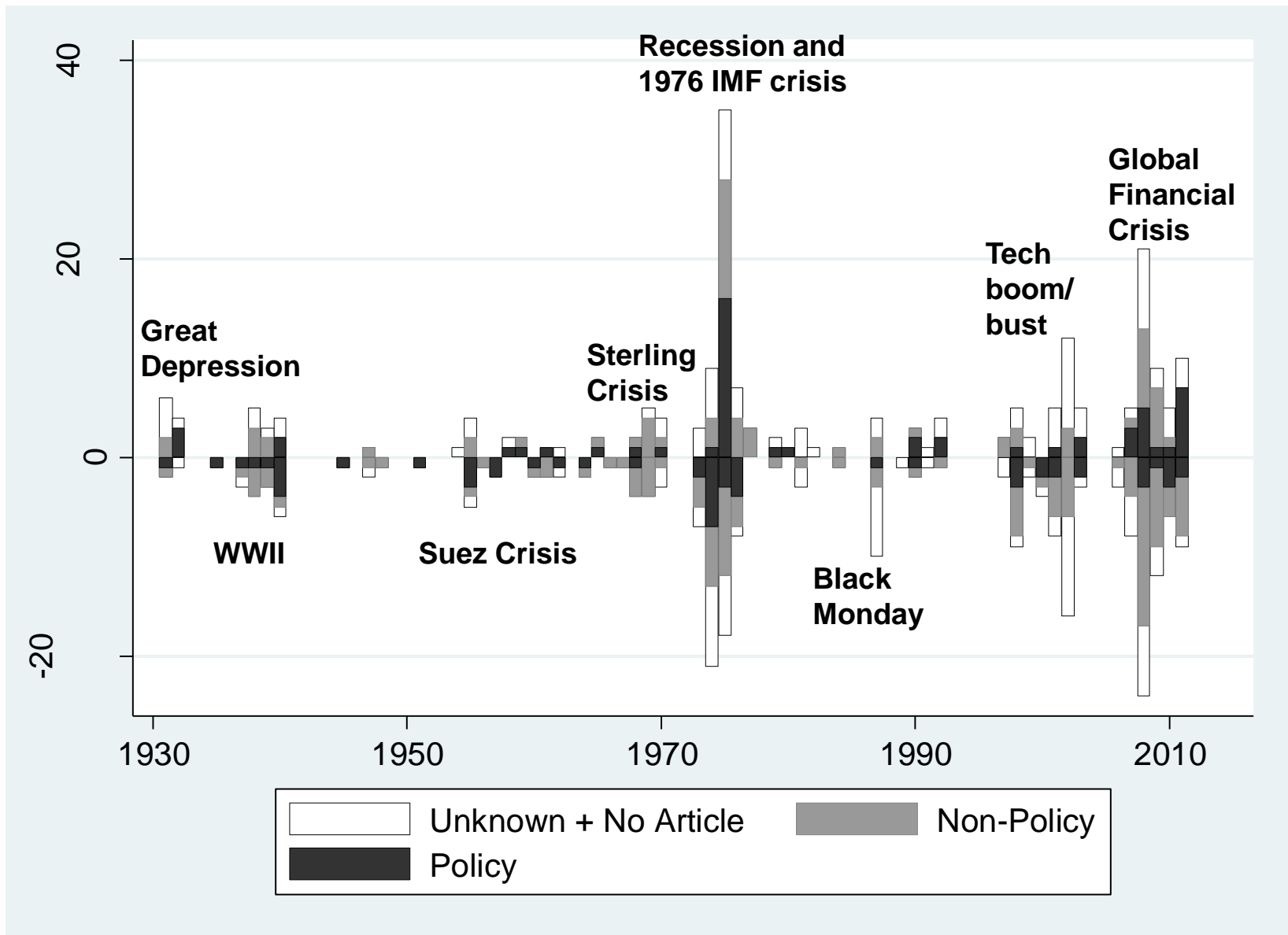
International Results

Global sample selects countries with active stock-markets and good on-line press archives

Country	Start	Sources	Jump Threshold
United States	1885	Wall Street Journal, etc.	2.50%
United Kingdom	1930	Financial Times (UK Edition)	2.50%
Australia	1985	Australian Financial Times	2.50%
Canada	1980	The Globe and Mail	2.00%
China (Hong Kong)	1988	South China Morning Post	3.80%
China (Shanghai)	1994	Shanghai Securities Journal	4.00%
Germany	1985	Handelsblat, FAZ	2.50%
Greece	1989	Kathimerini, To Vima	4.00%
Ireland	1987	The Irish Times	2.50%
Japan	1981	Yomiuri and Asahi	3.00%
New Zealand	1996	New Zealand Herald	2.50%
Saudi Arabia	1994	Al Riyadh	2.50%
Singapore	1980	Business Times and Straits Times	2.50%
South Africa	1986	Business Day	2.50%
South Korea	1980	Chosun Ilbo	2.50%

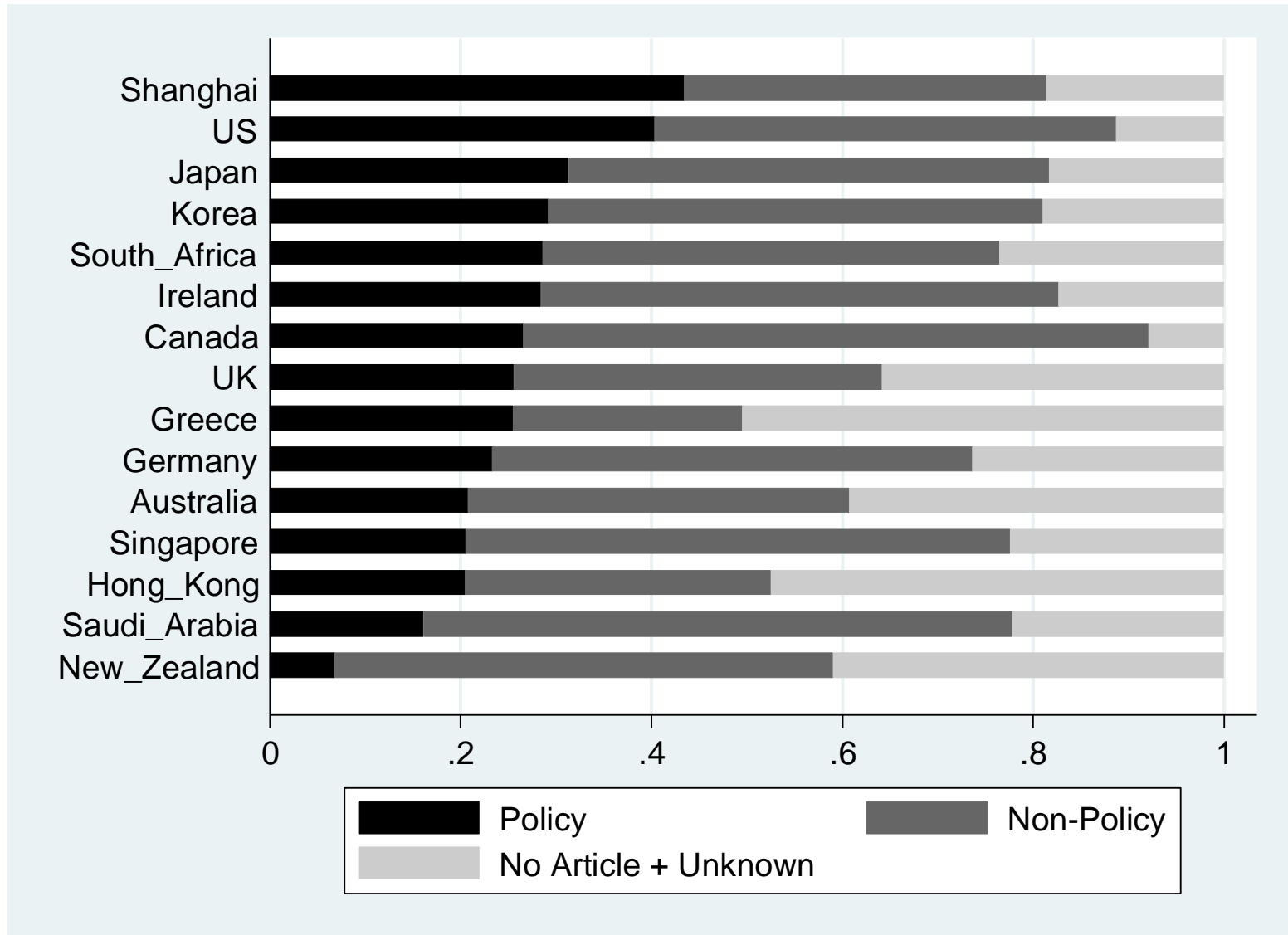
Jump threshold was chosen such that jumps were approximately 1% of trading days

Count by year for the UK (policy 33%)



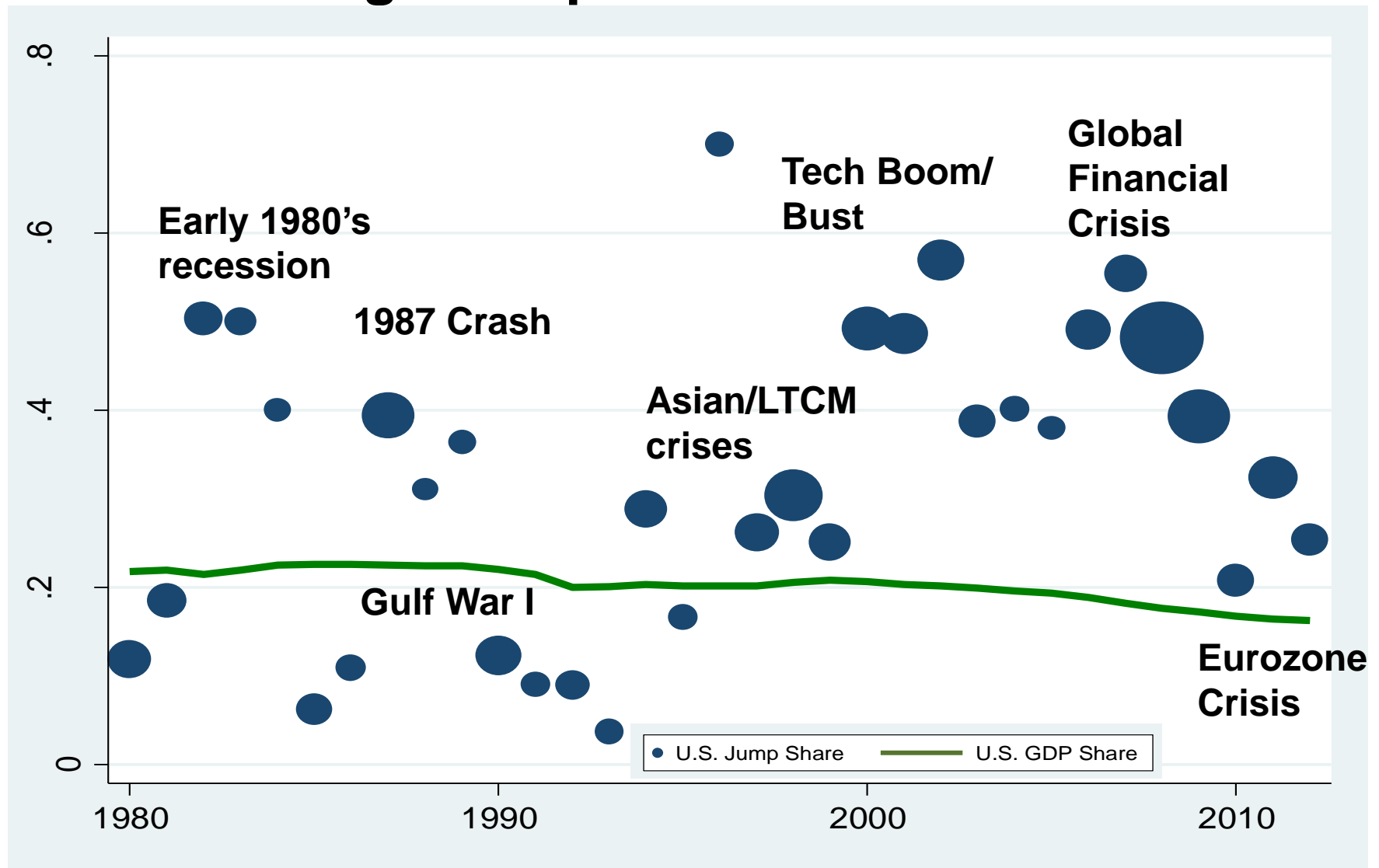
Notes: Each bar represents the number of jumps from each category within a given year

Policy Split by Country – known share is 41%



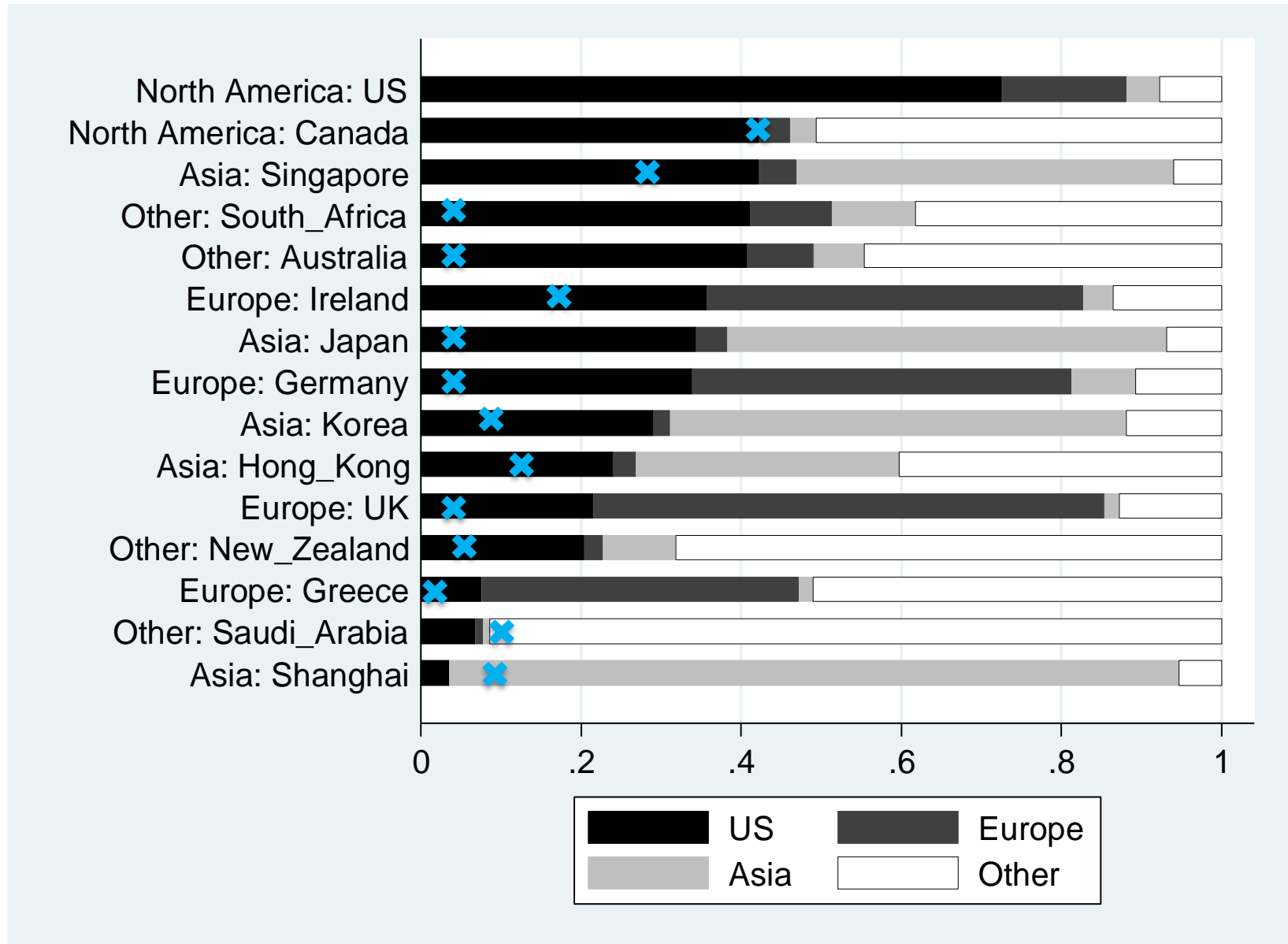
Notes: Each bar is the share of jumps by category within each country. All years available for each country are used.

US share large compared to GDP share



Notes: Share of US source of stock-market jumps averaged over non-US countries by year: Australia, Canada, China (HK), China (Shanghai), Germany, Greece, Ireland, Japan, New Zealand, Saudi Arabia, Singapore, South Africa, South Korea and UK. Dot size is proportional to the average number of jumps by country/year. GDP share is "Gross domestic product based on purchasing-power-parity (PPP) share of world total" from the IMF

US jump share is also higher than US trade-share



Notes: Shows share of jumps by geographic origin (bars). Crosses shows the average trade (gross exports + gross imports) from the US as a share of domestic GDP between 1999 and 2015.

Conclusion

1. 36% US jumps attributed to policy (and 41% internationally)
2. Realized volatility is lower following policy jumps, especially monetary policy
3. Outside the US, newspapers attribute 34% of jumps to US events – above 11% US GDP share – and this is rising
4. Volatility and trading volume are lower after jumps with clearer explanations

Next steps:

1. Expand clarity index
2. Validate clarity with machine learning